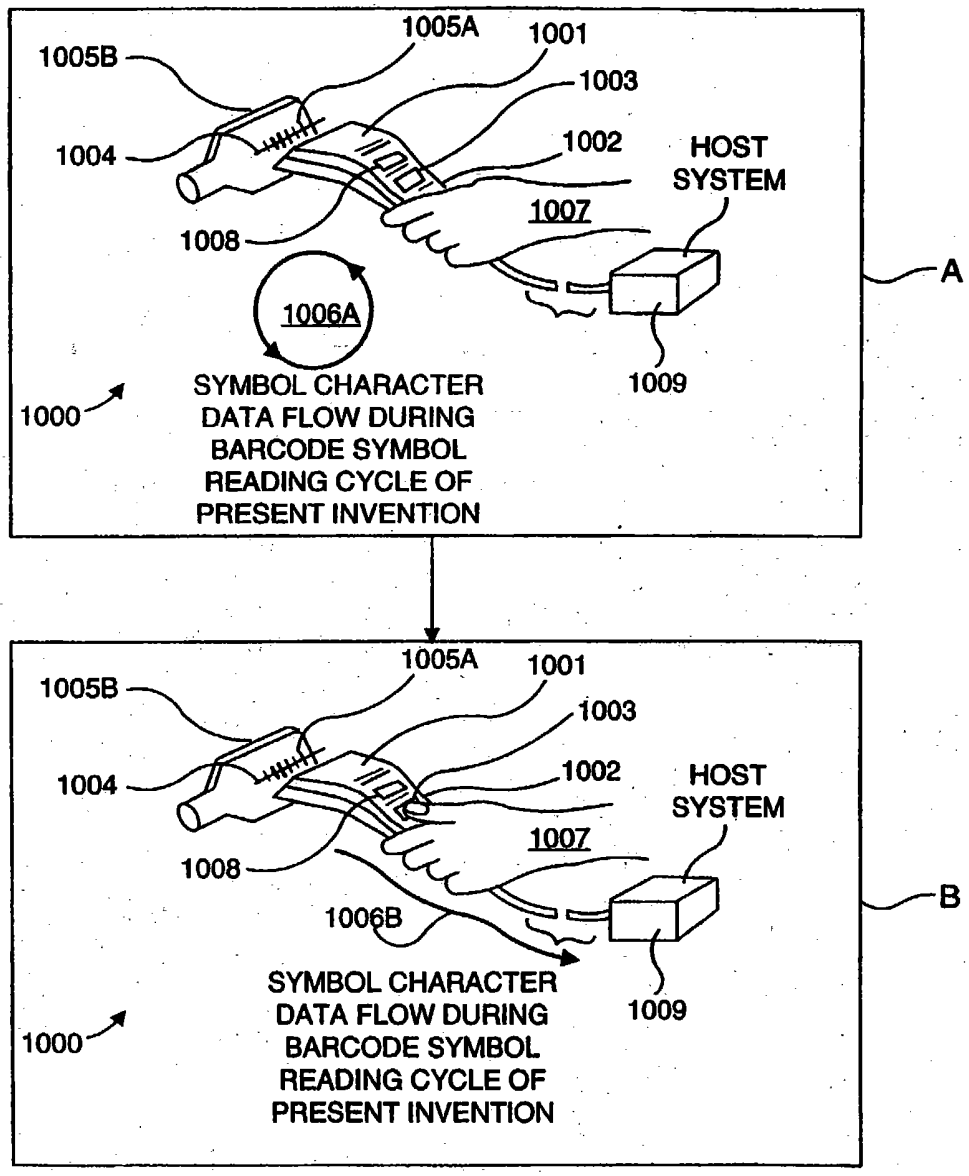

1005A
1001
1005B
1003
1004
1002
HOST SYSTEM
1007
1008
1006A
1009
A
1000
SYMBOL CHARACTER DATA FLOW DURING BARCODE SYMBOL READING CYCLE OF PRESENT INVENTION
1005A
1001
1005B
1003
1004
1002
HOST SYSTEM
1007
1008
1006B
1009
B
1000
SYMBOL CHARACTER DATA FLOW DURING BARCODE SYMBOL READING CYCLE OF PRESENT INVENTION

FIG. 1

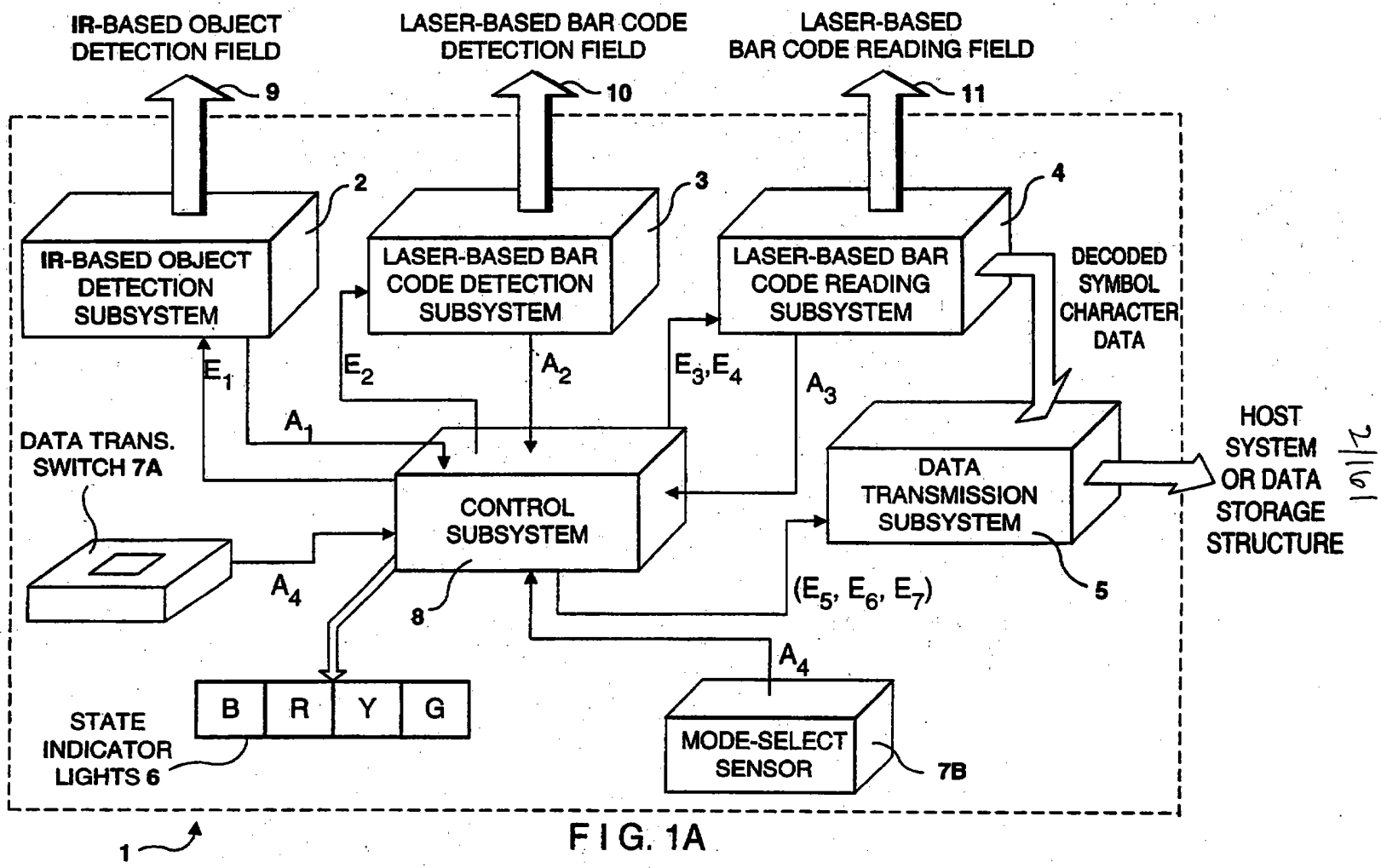

IR-BASED OBJECT DETECTION FIELD
9
LASER-BASED BAR CODE DETECTION FIELD
10
LASER-BASED BAR CODE READING FIELD
11
IR-BASED OBJECT DETECTION SUBSYSTEM
2
LASER-BASED BAR CODE DETECTION SUBSYSTEM
3
LASER-BASED BAR CODE READING SUBSYSTEM
4
DECODED SYMBOL CHARACTER DATA
E_1
E_2
A_2
E_3, E_4
A_3
A_1
DATA TRANS. SWITCH 7A
CONTROL SUBSYSTEM
DATA TRANSMISSION SUBSYSTEM
HOST SYSTEM OR DATA STORAGE STRUCTURE
A_4
8
(E_5, E_6, E_7)
5
A_4
B
R
Y
G
STATE INDICATOR LIGHTS 6
MODE-SELECT SENSOR
7B
1

FIG. 1A

2/61

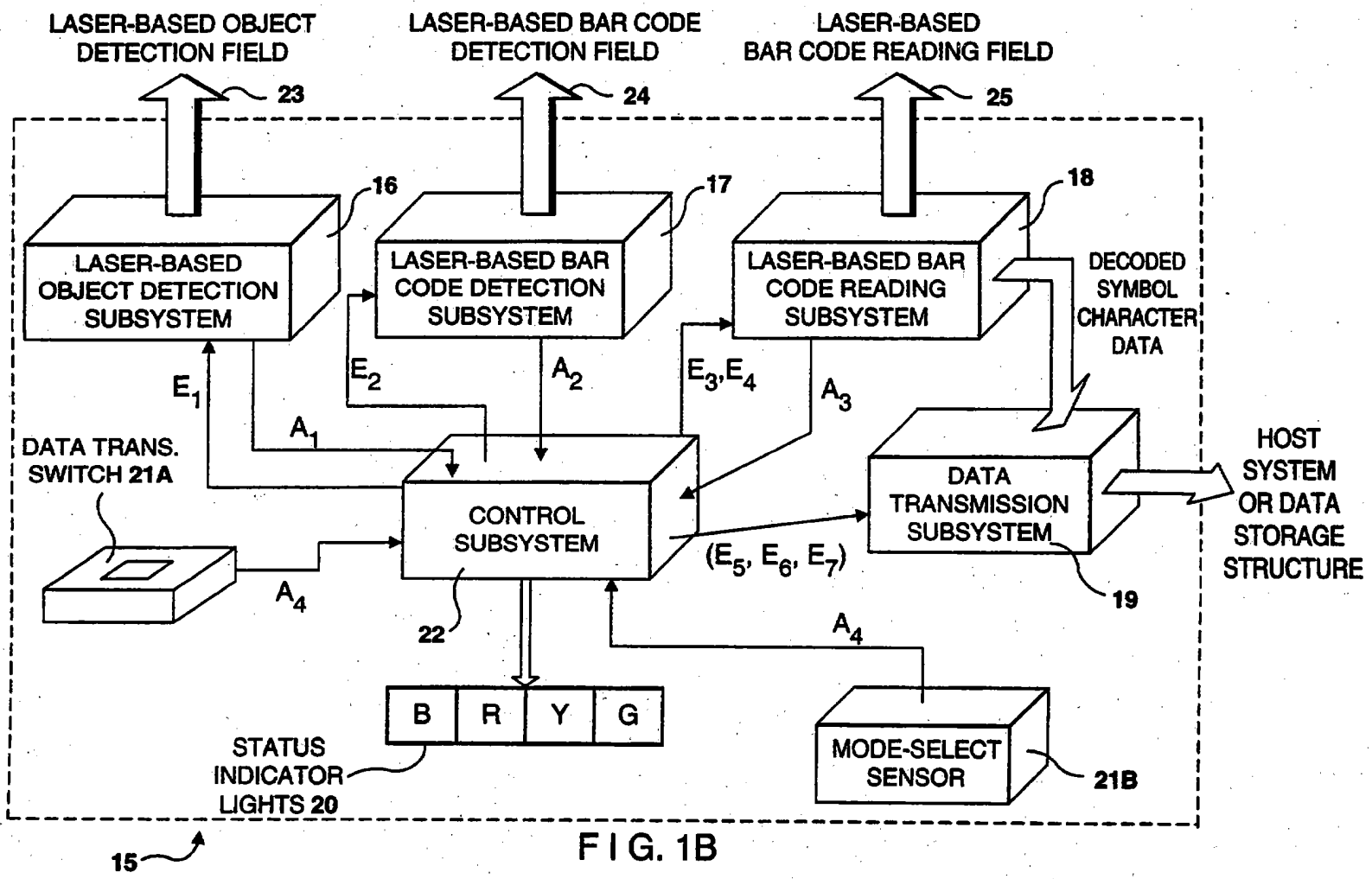

LASER-BASED OBJECT DETECTION FIELD
23
LASER-BASED BAR CODE DETECTION FIELD
24
LASER-BASED BAR CODE READING FIELD
25
16
17
18
LASER-BASED OBJECT DETECTION SUBSYSTEM
LASER-BASED BAR CODE DETECTION SUBSYSTEM
LASER-BASED BAR CODE READING SUBSYSTEM
DECODED SYMBOL CHARACTER DATA
E1
E2
A2
E3,E4
A3
A1
DATA TRANS. SWITCH 21A
CONTROL SUBSYSTEM
DATA TRANSMISSION SUBSYSTEM
HOST SYSTEM OR DATA STORAGE STRUCTURE
(E5, E6, E7)
19
A4
22
A4
B
R
Y
G
STATUS INDICATOR LIGHTS 20
MODE-SELECT SENSOR
21B
15

FIG. 1B

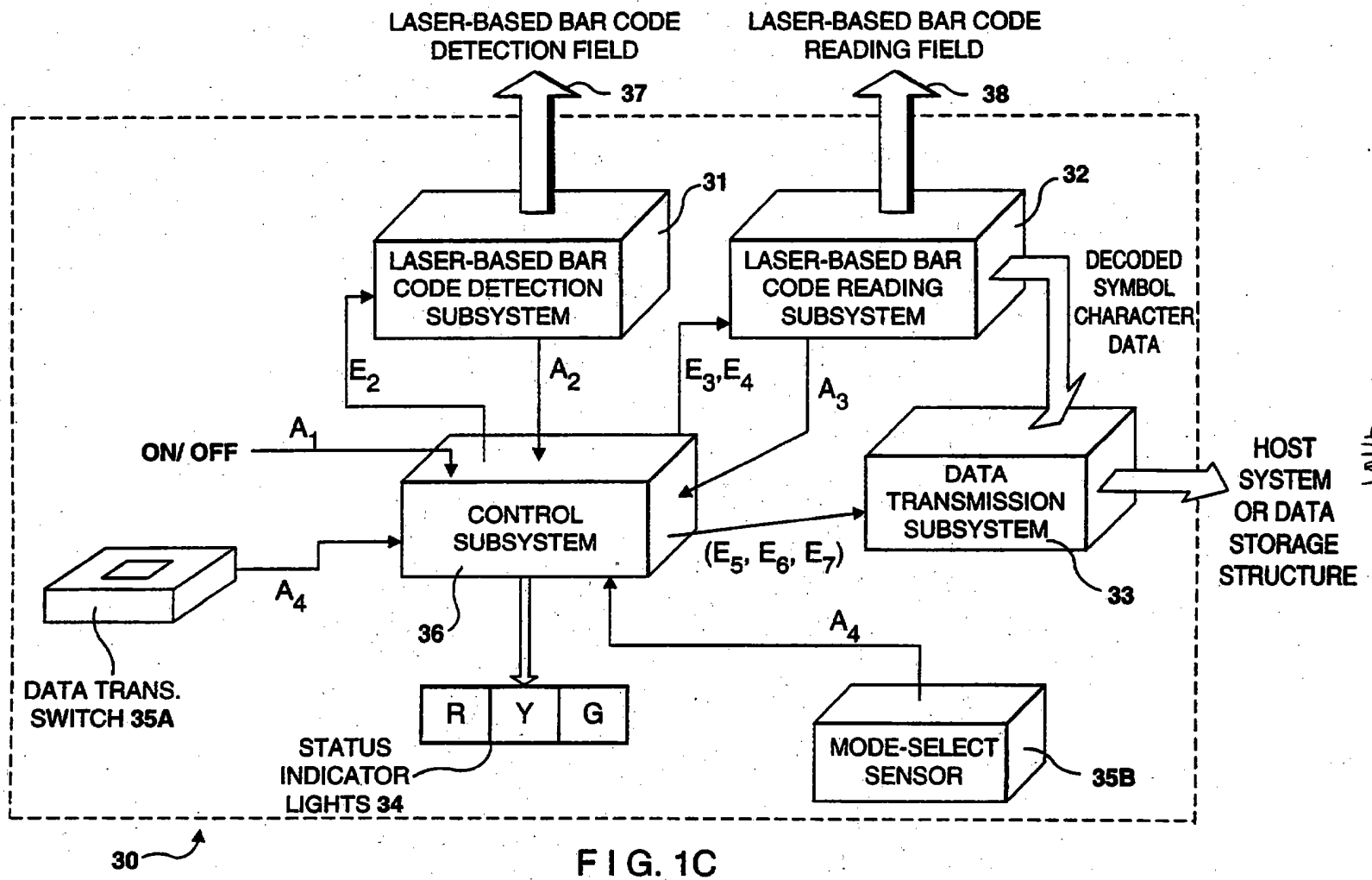

LASER-BASED BAR CODE DETECTION FIELD
37
LASER-BASED BAR CODE READING FIELD
38
31
32
LASER-BASED BAR CODE DETECTION SUBSYSTEM
LASER-BASED BAR CODE READING SUBSYSTEM
DECODED SYMBOL CHARACTER DATA
E2
A2
E3,E4
A3
A1
ON/ OFF
CONTROL SUBSYSTEM
DATA TRANSMISSION SUBSYSTEM
HOST SYSTEM OR DATA STORAGE STRUCTURE
(E5, E6, E7)
33
A4
36
A4
DATA TRANS. SWITCH 35A
R
Y
G
STATUS INDICATOR LIGHTS 34
MODE-SELECT SENSOR
35B
30

FIG. 1C

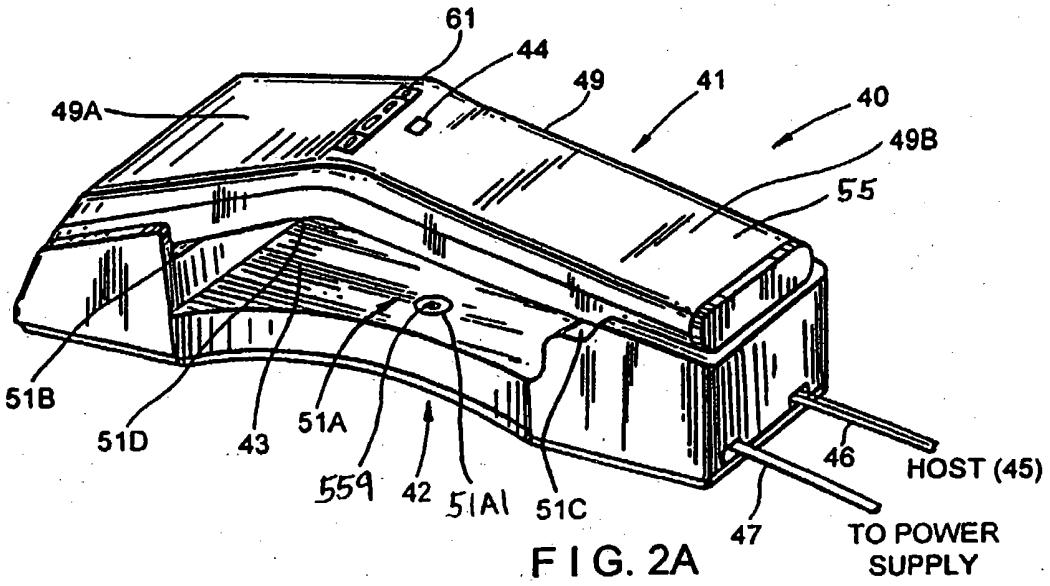


FIG. 2A

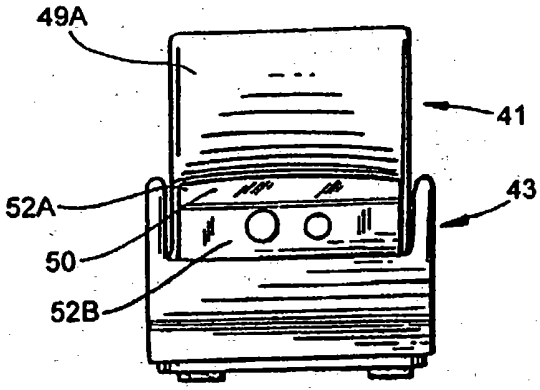


FIG. 2B

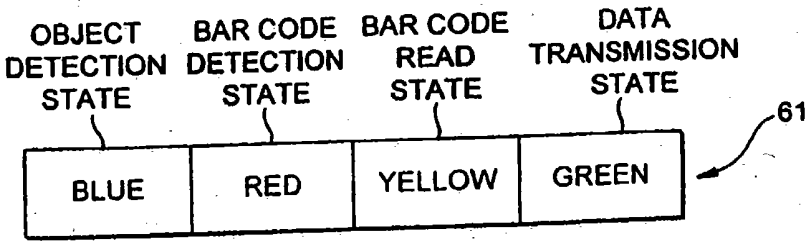


FIG. 2C

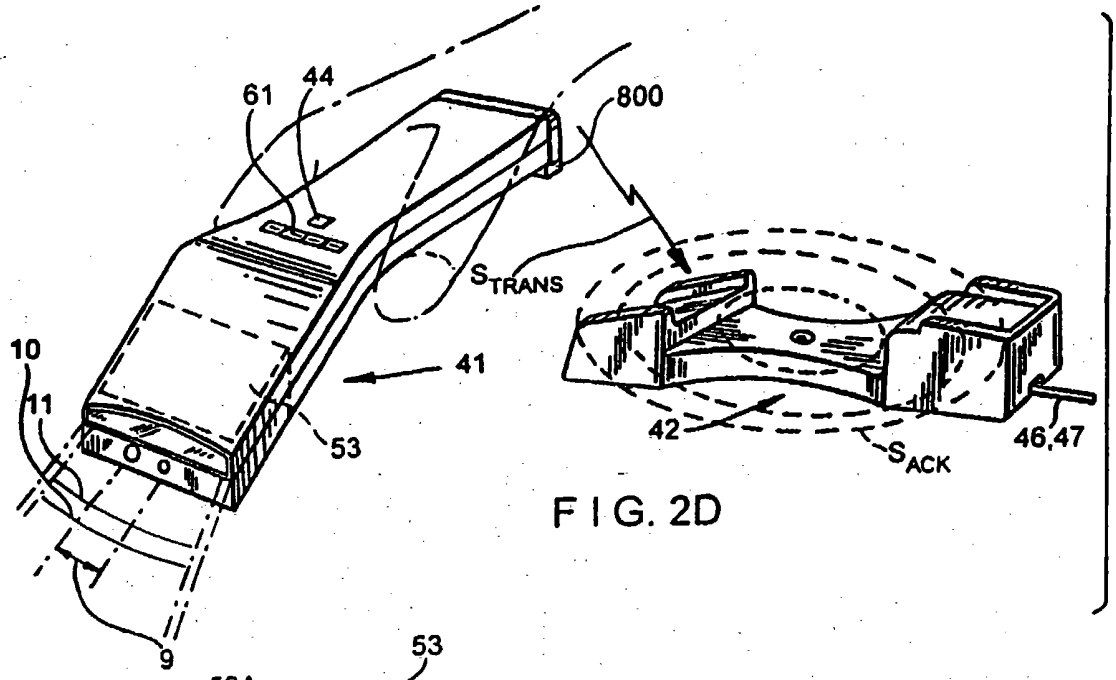


FIG. 2D

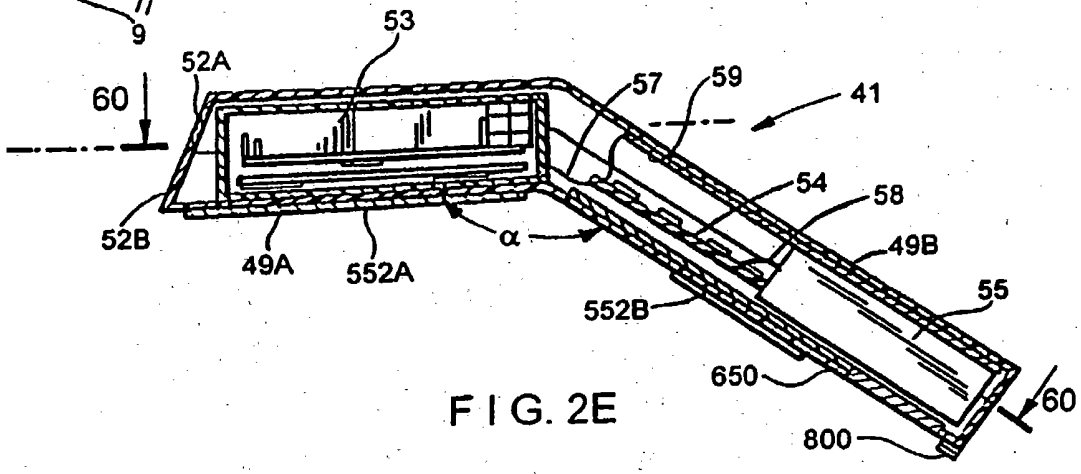


FIG. 2E

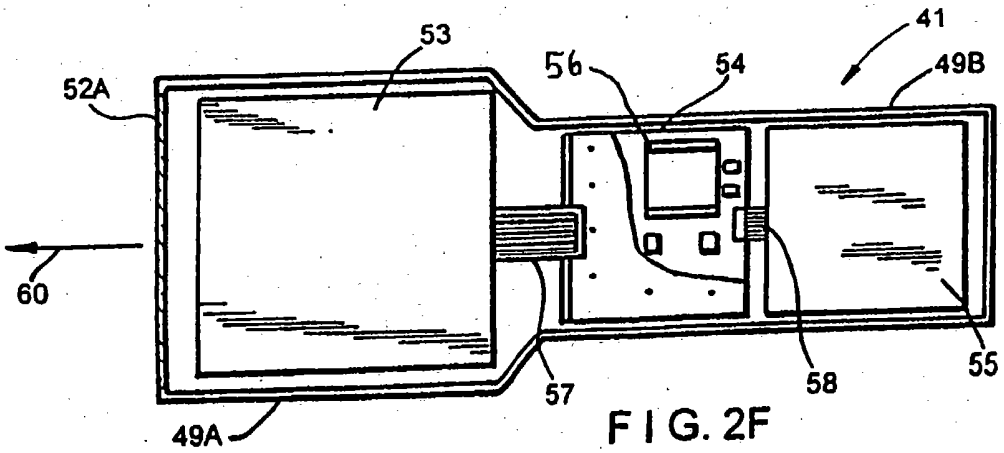


FIG. 2F

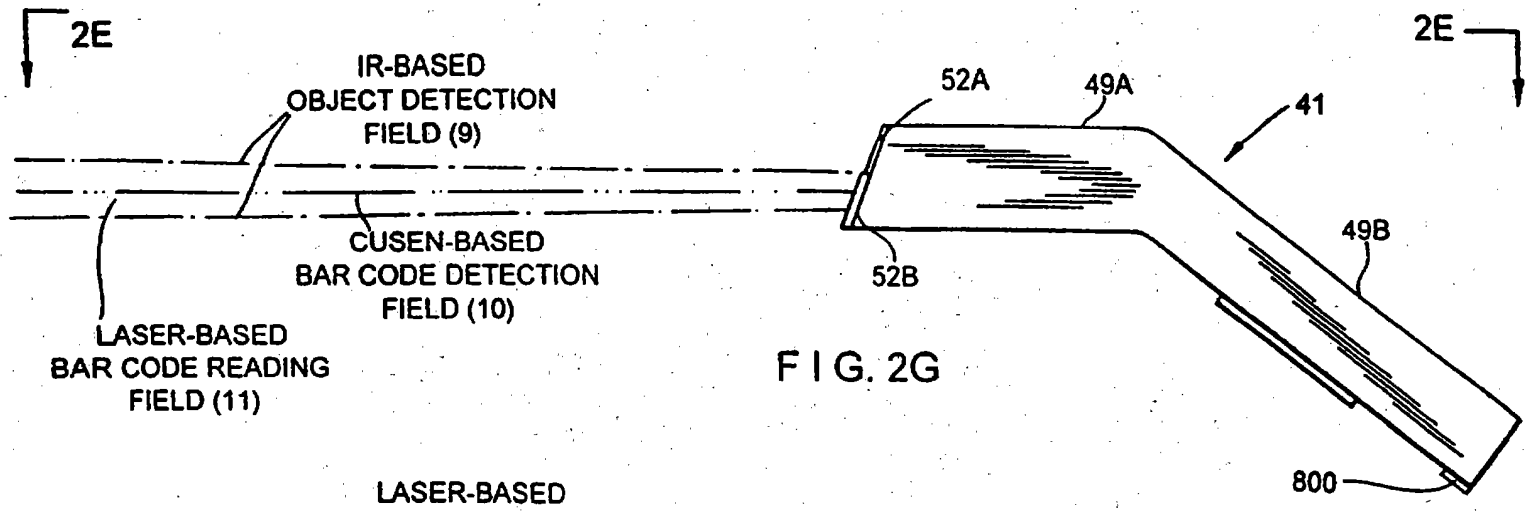

2E
IR-BASED
OBJECT DETECTION
FIELD (9)
CUSEN-BASED
BAR CODE DETECTION
FIELD (10)
LASER-BASED
BAR CODE READING
FIELD (11)
52A
49A
41
49B
52B
2E
800

FIG. 2G

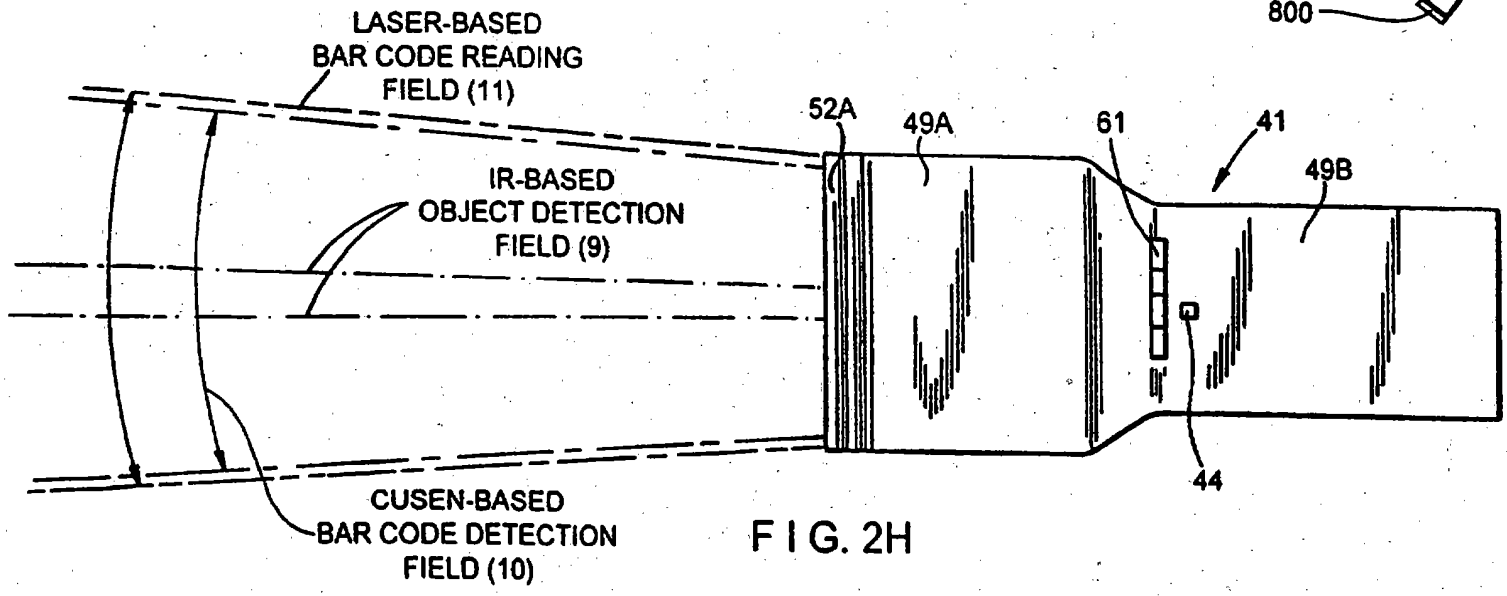

LASER-BASED
BAR CODE READING
FIELD (11)
IR-BASED
OBJECT DETECTION
FIELD (9)
CUSEN-BASED
BAR CODE DETECTION
FIELD (10)
52A
49A
61
41
49B
44

FIG. 2H

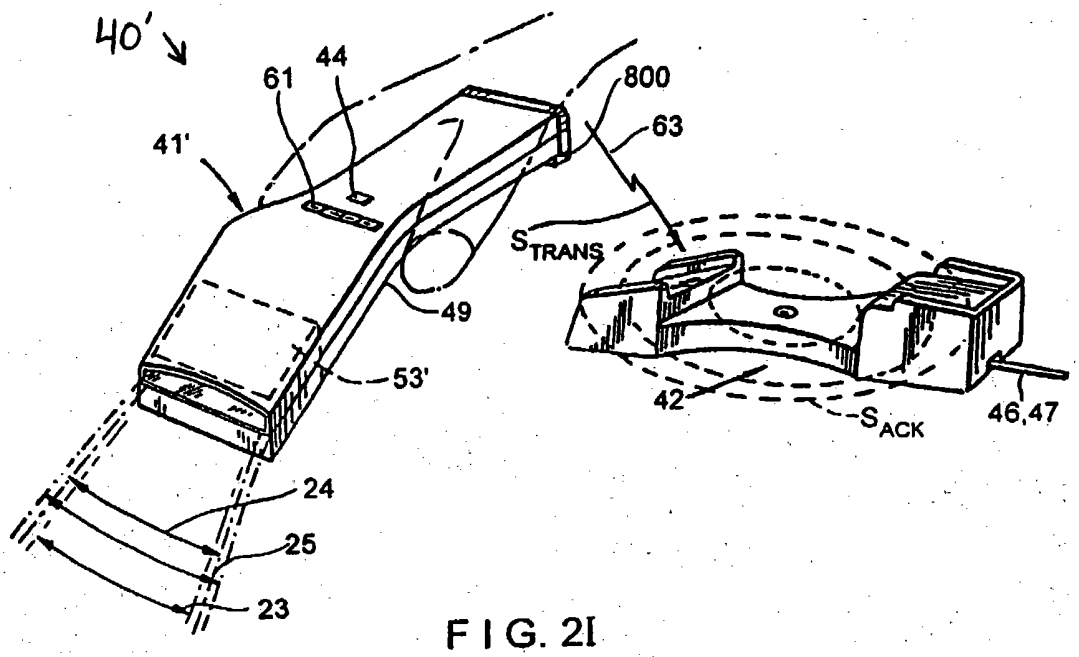

40'
61
44
800
63
41'
S_{TRANS}
49
53'
42
S_{ACK}
46,47
24
25
23

FIG. 2I

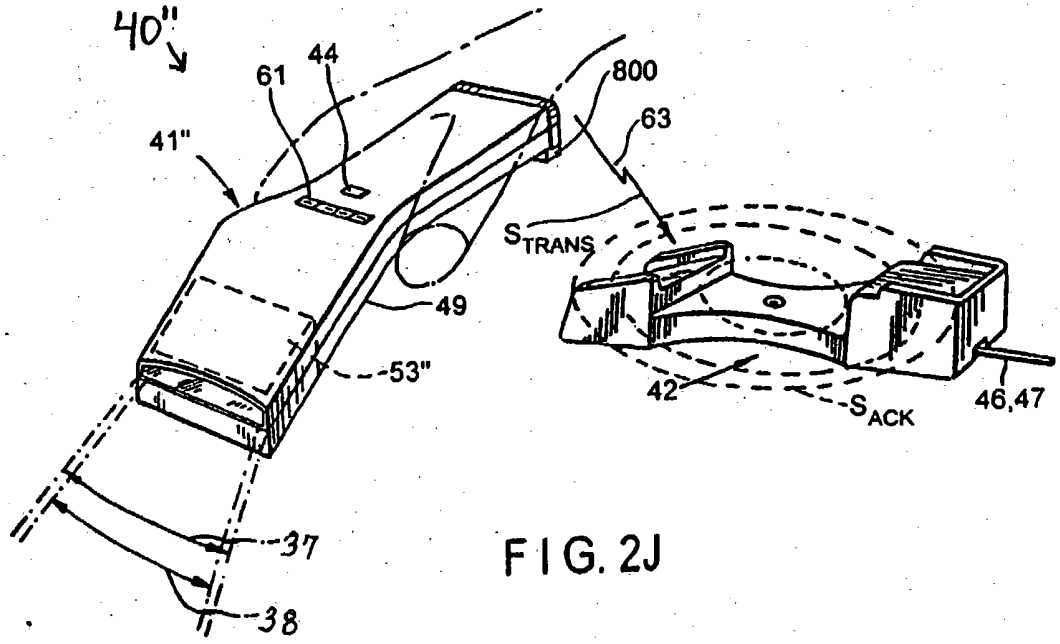

40"
61
44
800
63
41"
S_{TRANS}
49
53"
42
S_{ACK}
46,47
37
38

FIG. 2J

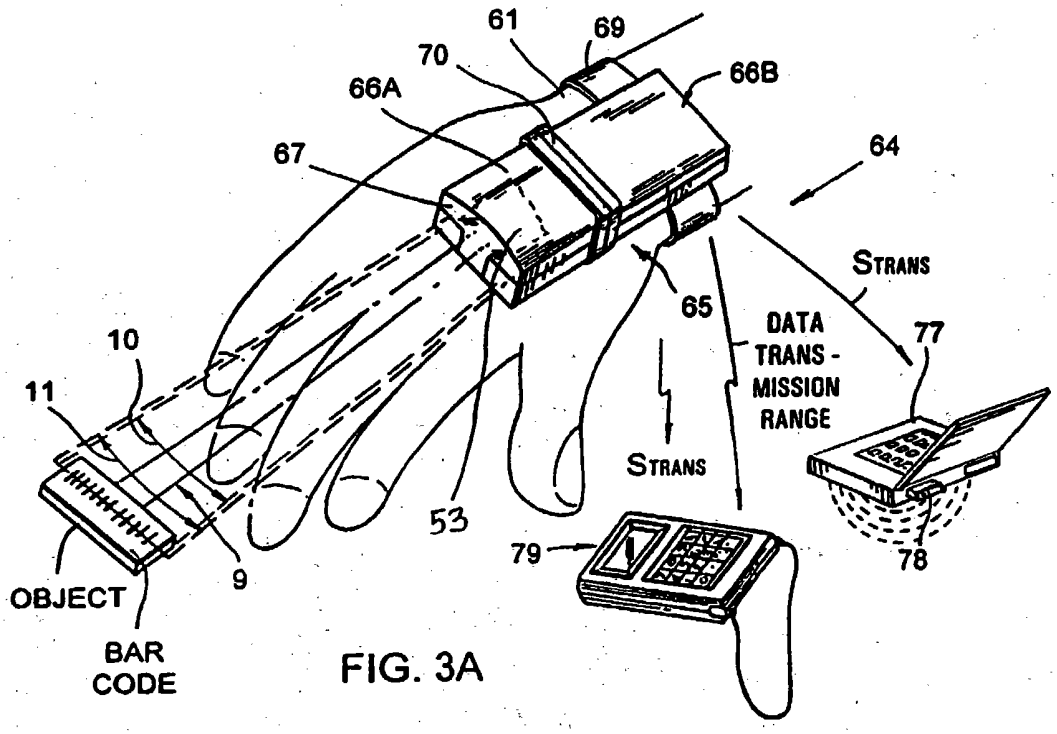


FIG. 3A

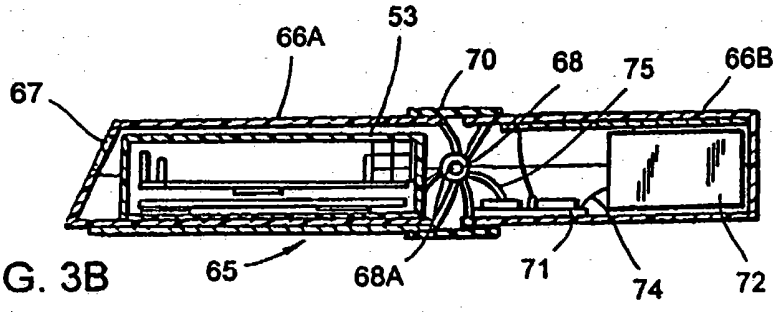


FIG. 3B

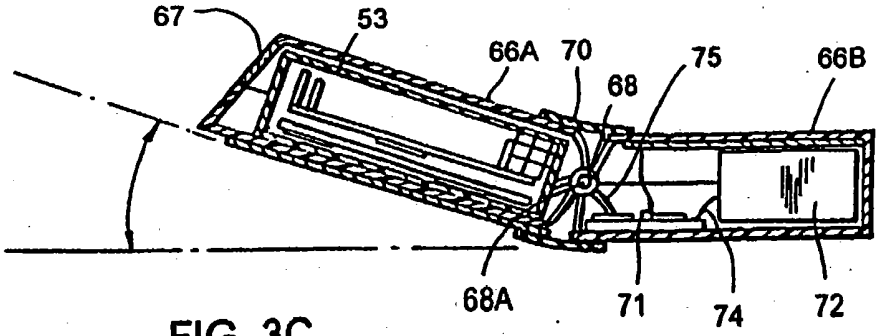


FIG. 3C

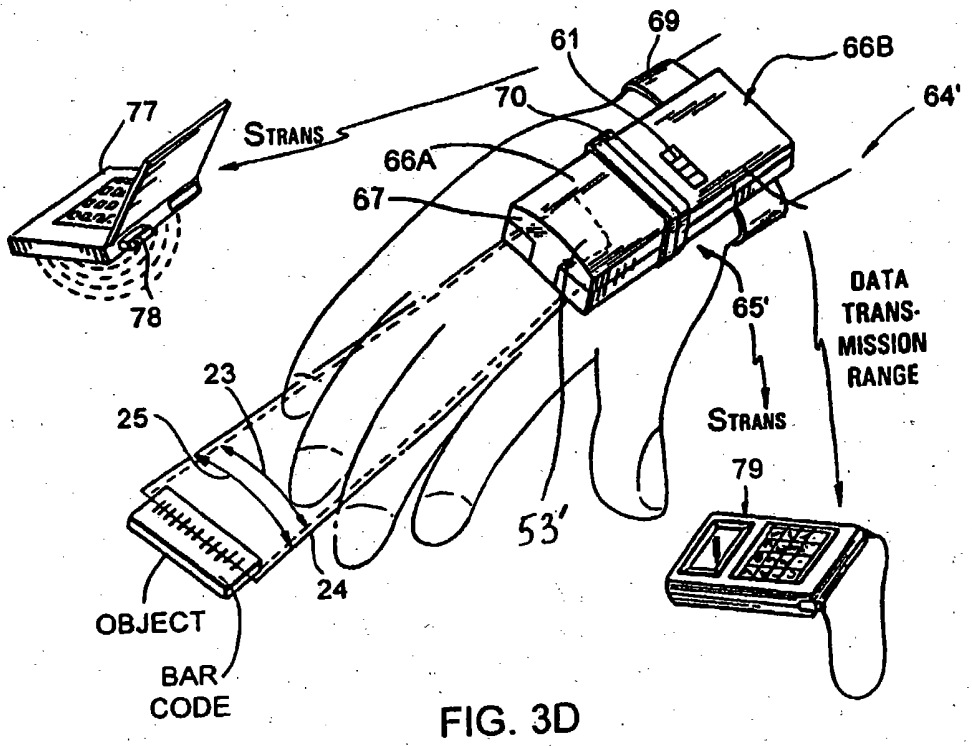

61
69
66B
64'
70
77
STRANS
66A
67
78
65'
DATA
TRANS-
MISSION
RANGE
23
25
STRANS
79
53'
24
OBJECT
BAR
CODE

FIG. 3D

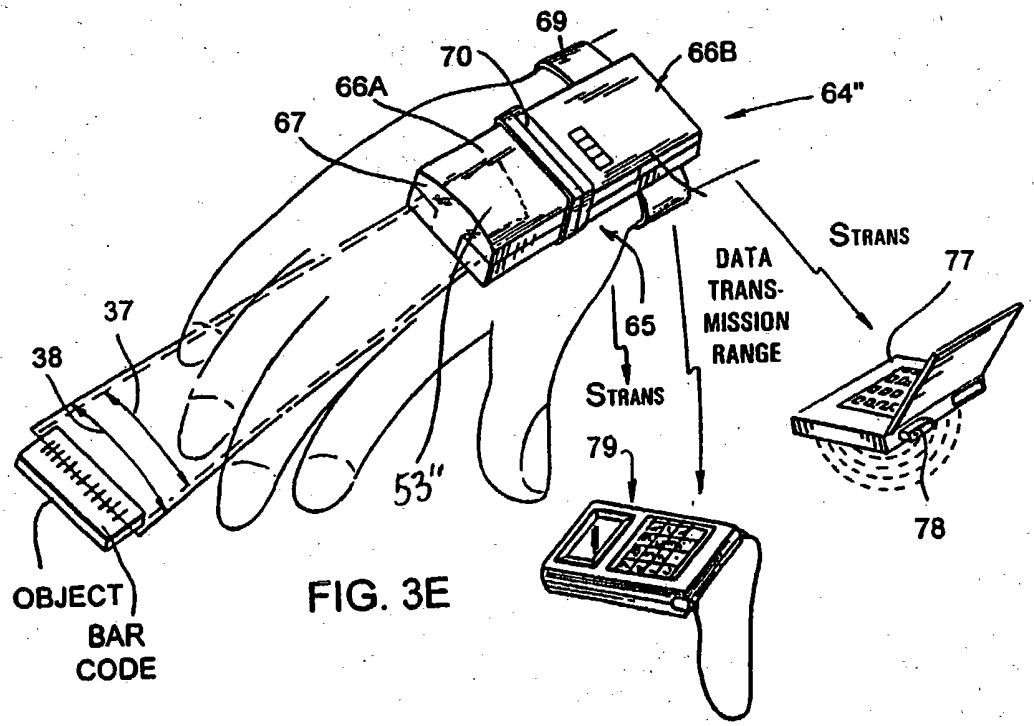

69
70
66B
66A
64"
67
STRANS
77
DATA
TRANS-
MISSION
RANGE
37
65
38
STRANS
79
53"
78
OBJECT
BAR
CODE

FIG. 3E

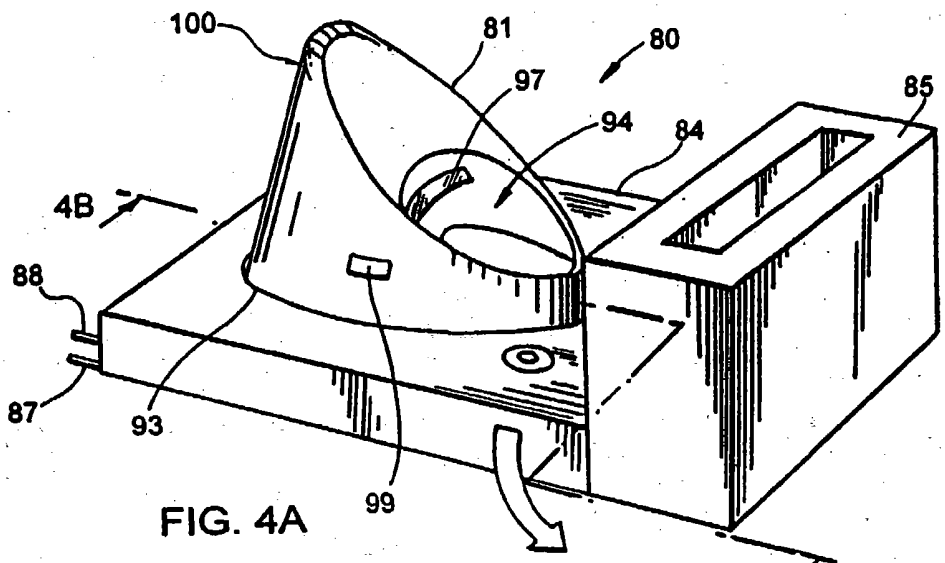


FIG. 4A

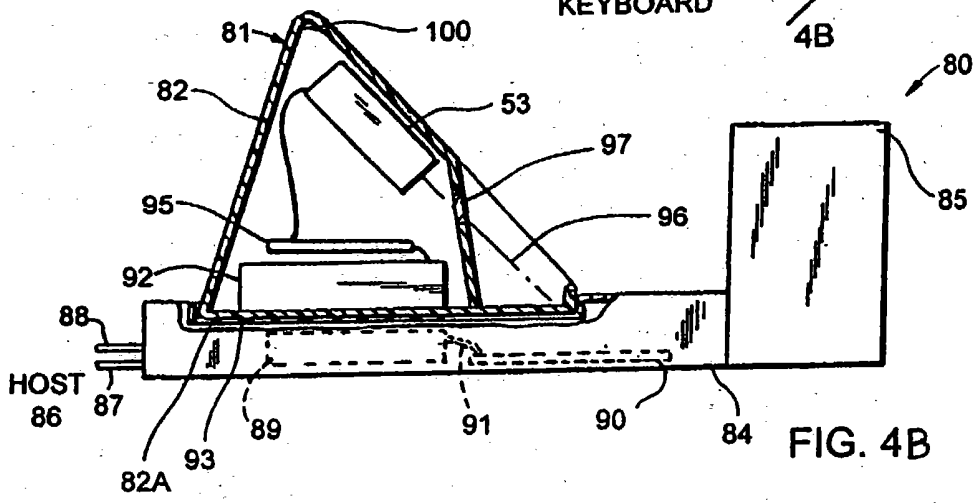


FIG. 4B

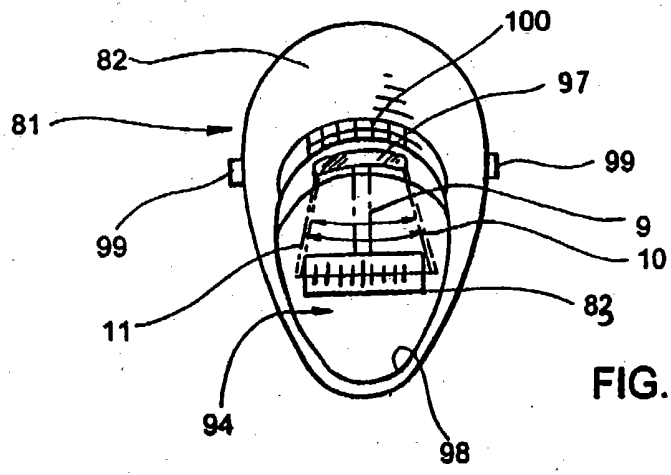


FIG. 4C

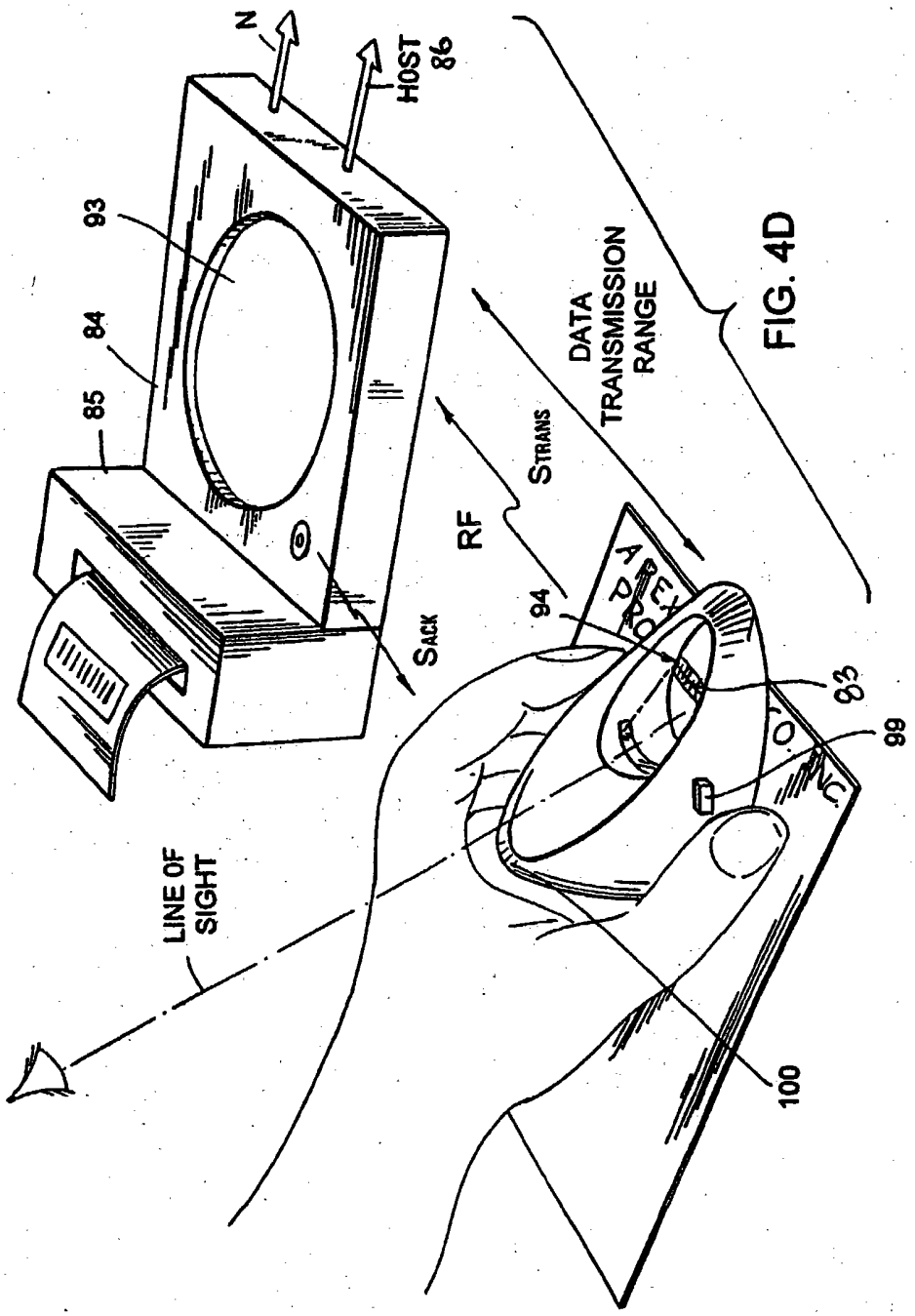

N
HOST
86
93
84
85
SACK
RF
STRANS
DATA
TRANSMISSION
RANGE
94
83
99
100
LINE OF
SIGHT

FIG. 4D

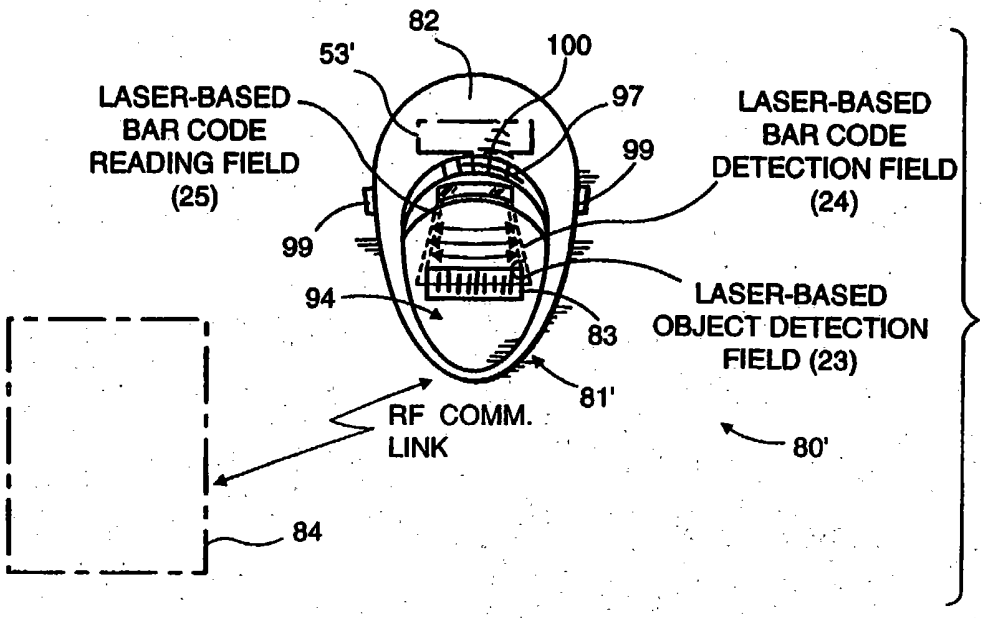

82
53'
100
97
99
99
94
83
81'
LASER-BASED
BAR CODE
READING FIELD
(25)
LASER-BASED
BAR CODE
DETECTION FIELD
(24)
LASER-BASED
OBJECT DETECTION
FIELD (23)
RF COMM.
LINK
80'
84

FIG. 4E

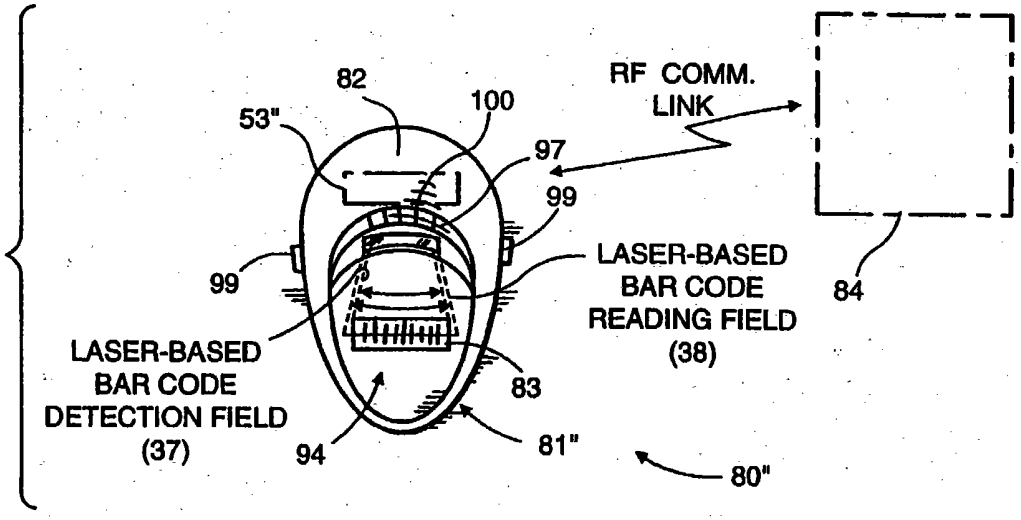

82
53"
100
97
99
99
94
83
81"
RF COMM.
LINK
LASER-BASED
BAR CODE
READING FIELD
(38)
LASER-BASED
BAR CODE
DETECTION FIELD
(37)
84
80"

FIG. 4F

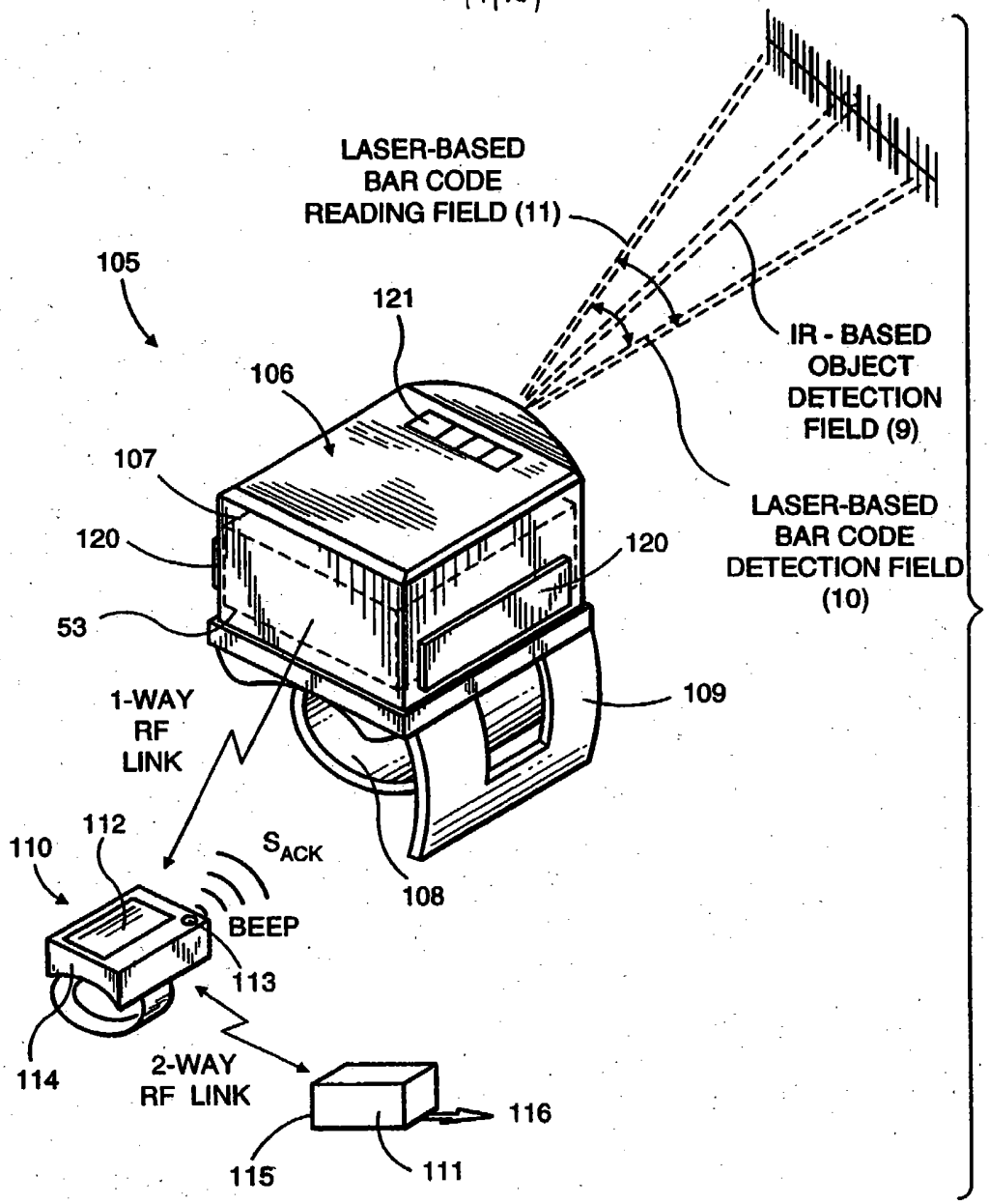

LASER-BASED
BAR CODE
READING FIELD (11)
105
121
106
IR - BASED
OBJECT
DETECTION
FIELD (9)
107
LASER-BASED
BAR CODE
DETECTION FIELD
(10)
120
120
53
109
1-WAY
RF
LINK
112
110
S_{ACK}
108
BEEP
113
114
2-WAY
RF LINK
116
115
111

FIG. 5A

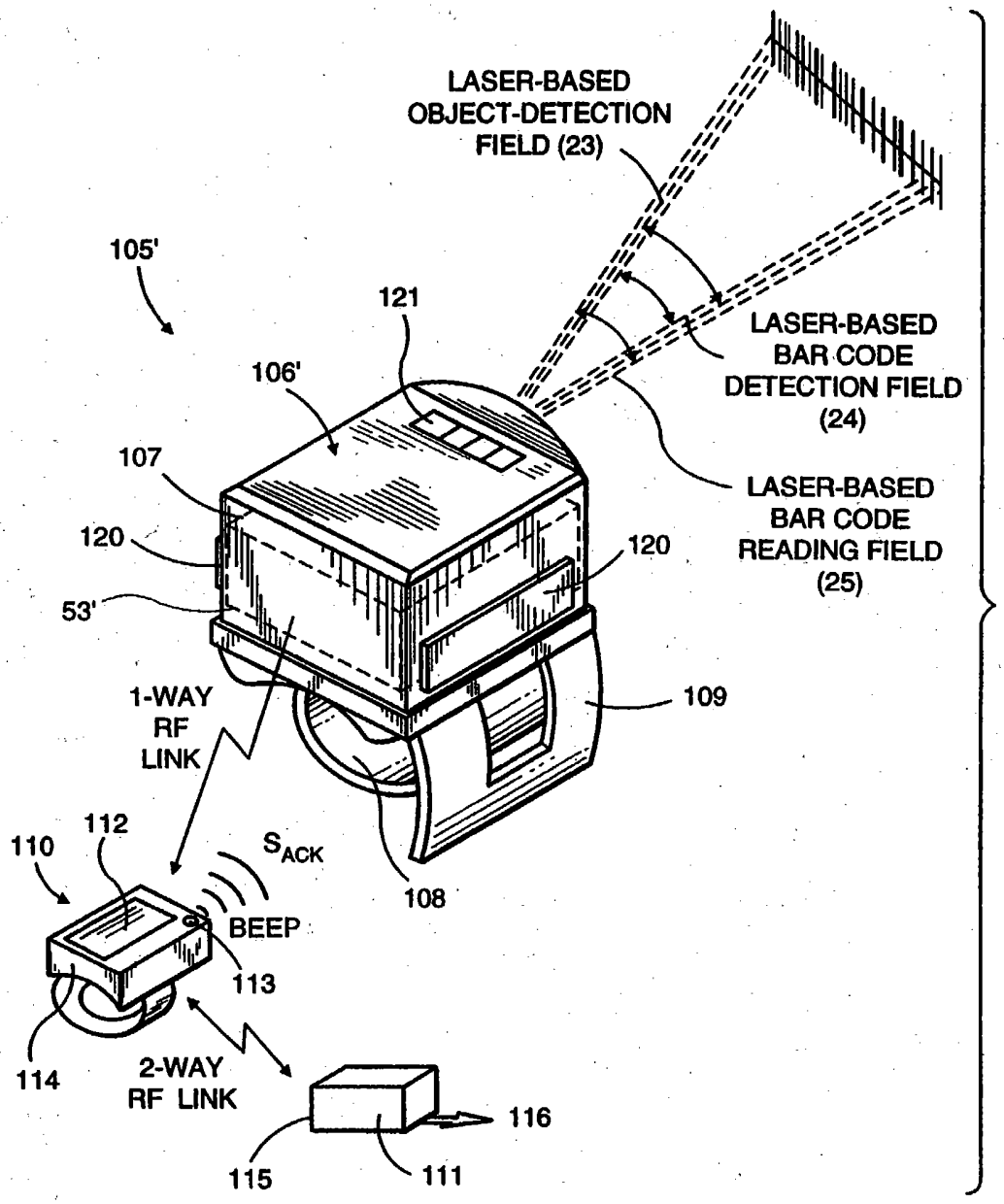

LASER-BASED
OBJECT-DETECTION
FIELD (23)
LASER-BASED
BAR CODE
DETECTION FIELD
(24)
LASER-BASED
BAR CODE
READING FIELD
(25)
105'
121
106'
107
120
120
53'
109
1-WAY
RF
LINK
110
112
S_{ACK}
BEEP
113
108
114
2-WAY
RF LINK
116
115
111

FIG. 5B

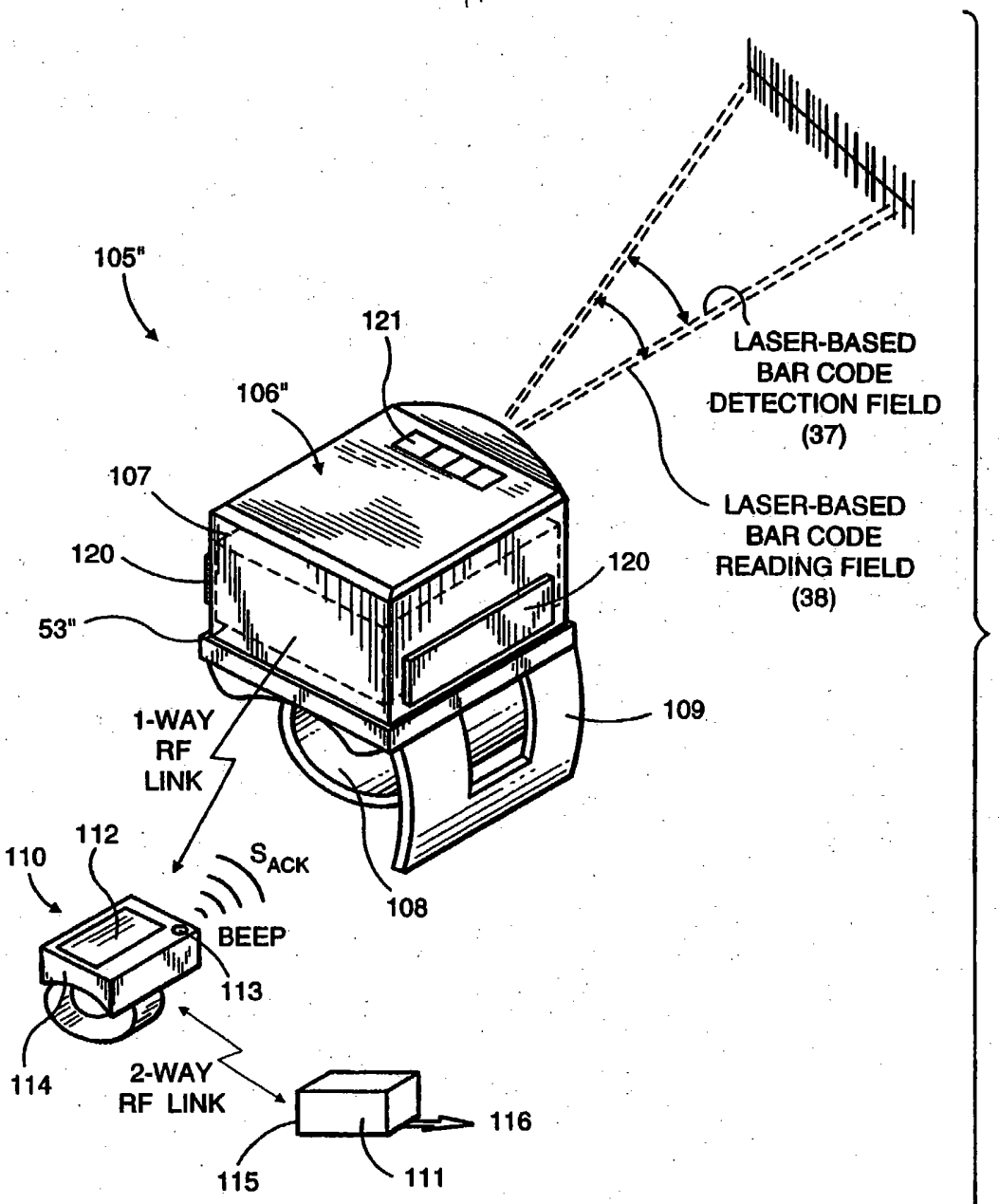

105"
121
106"
107
120
53"
120
109
1-WAY
RF
LINK
110
112
S_{ACK}
BEEP
113
108
114
2-WAY
RF LINK
116
115
111
LASER-BASED
BAR CODE
DETECTION FIELD
(37)
LASER-BASED
BAR CODE
READING FIELD
(38)

FIG. 5C

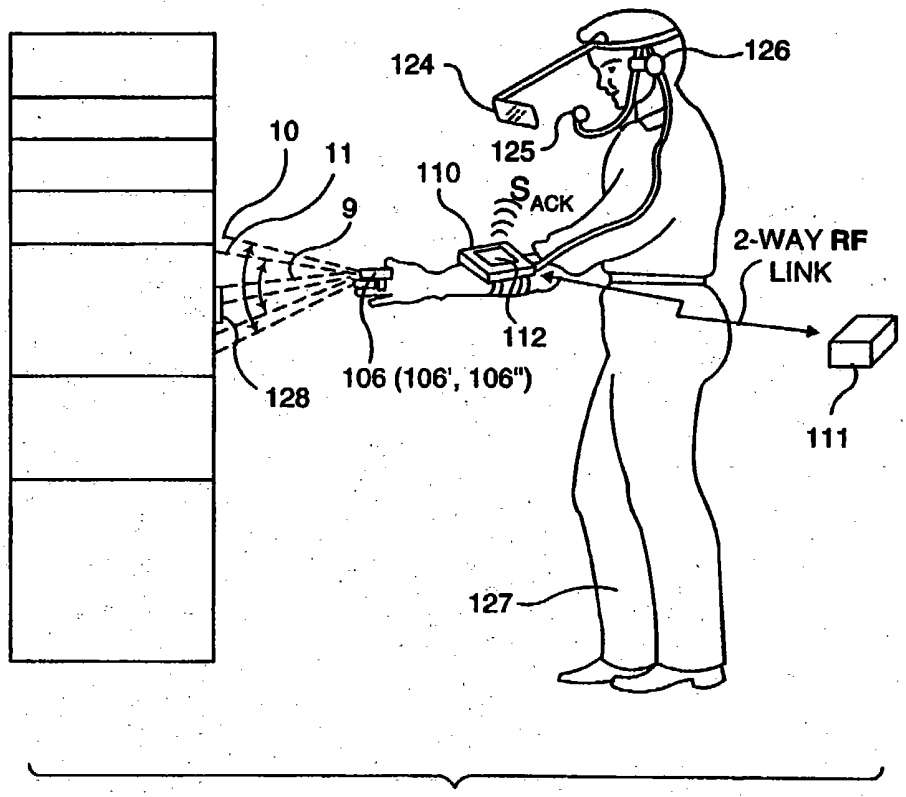

124
126
125
10
11
110
9
S_{ACK}
2-WAY RF
LINK
112
106 (106', 106")
128
111
127

FIG. 5D

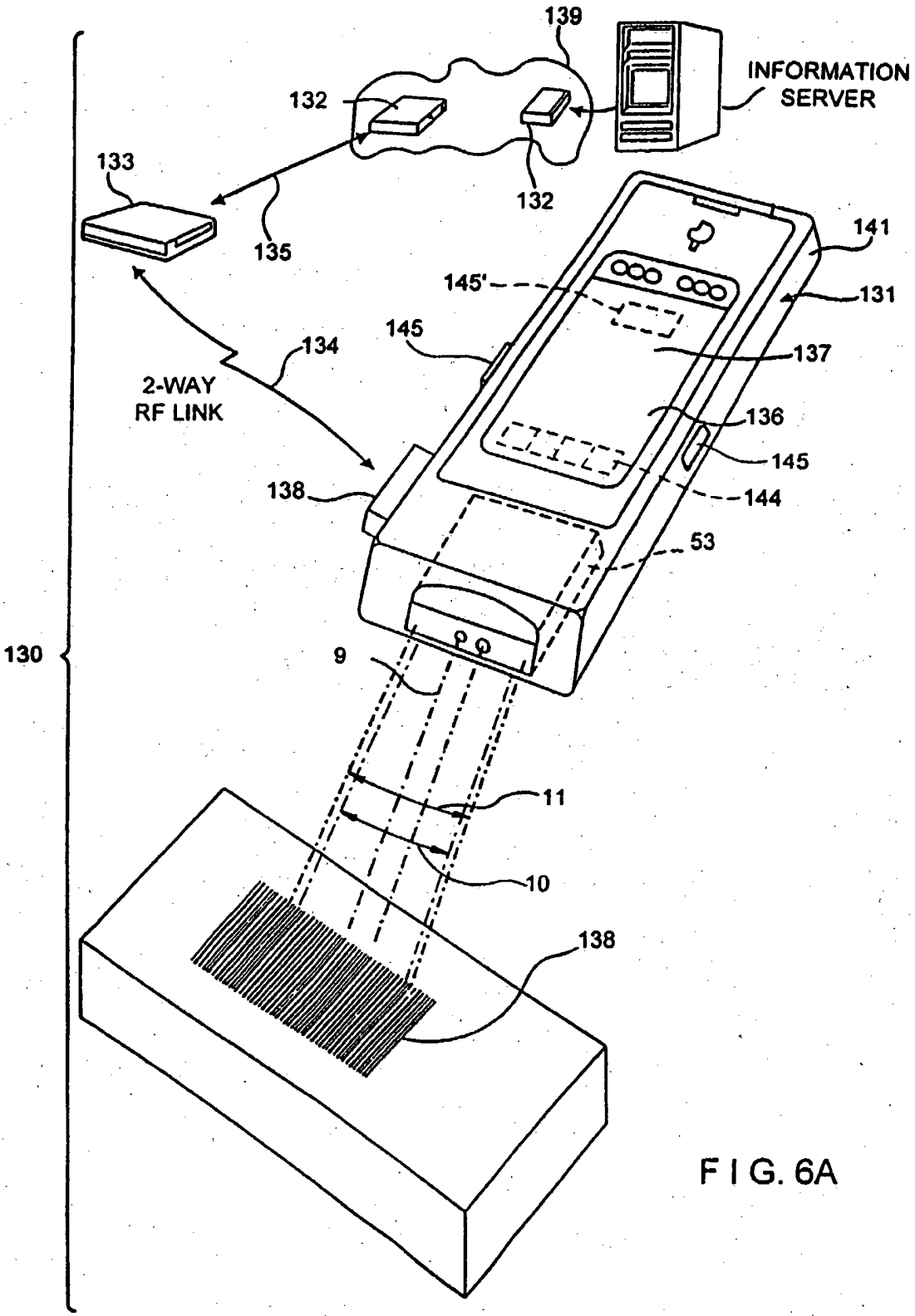

139
INFORMATION SERVER
132
132
133
135
141
145'
131
145
137
134
2-WAY RF LINK
136
145
138
144
53
130
9
11
10
138

FIG. 6A

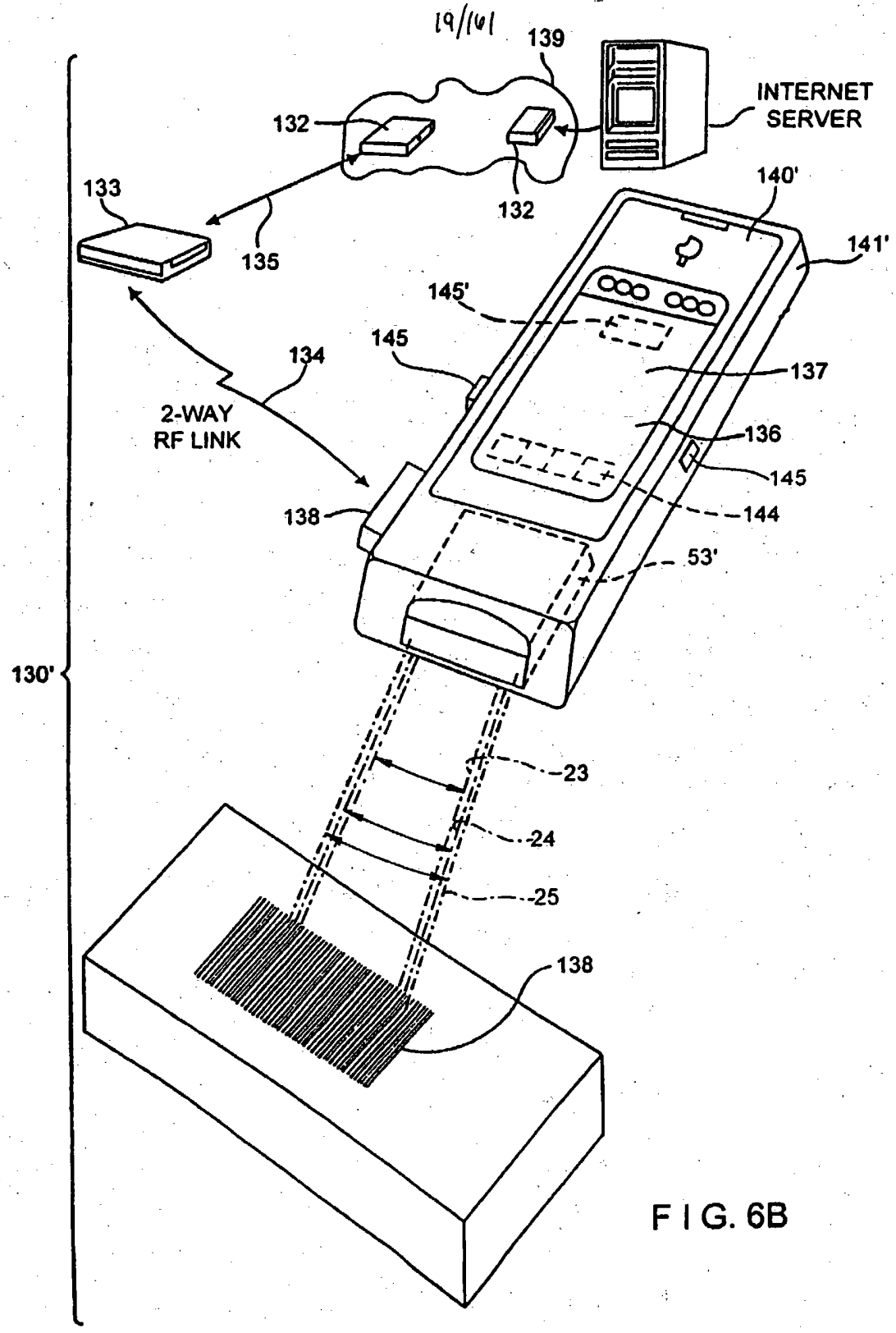

139
INTERNET SERVER
132
132
133
135
140'
141'
145'
145
134
137
2-WAY RF LINK
136
145
138
144
53'
130'
23
24
25
138

FIG. 6B

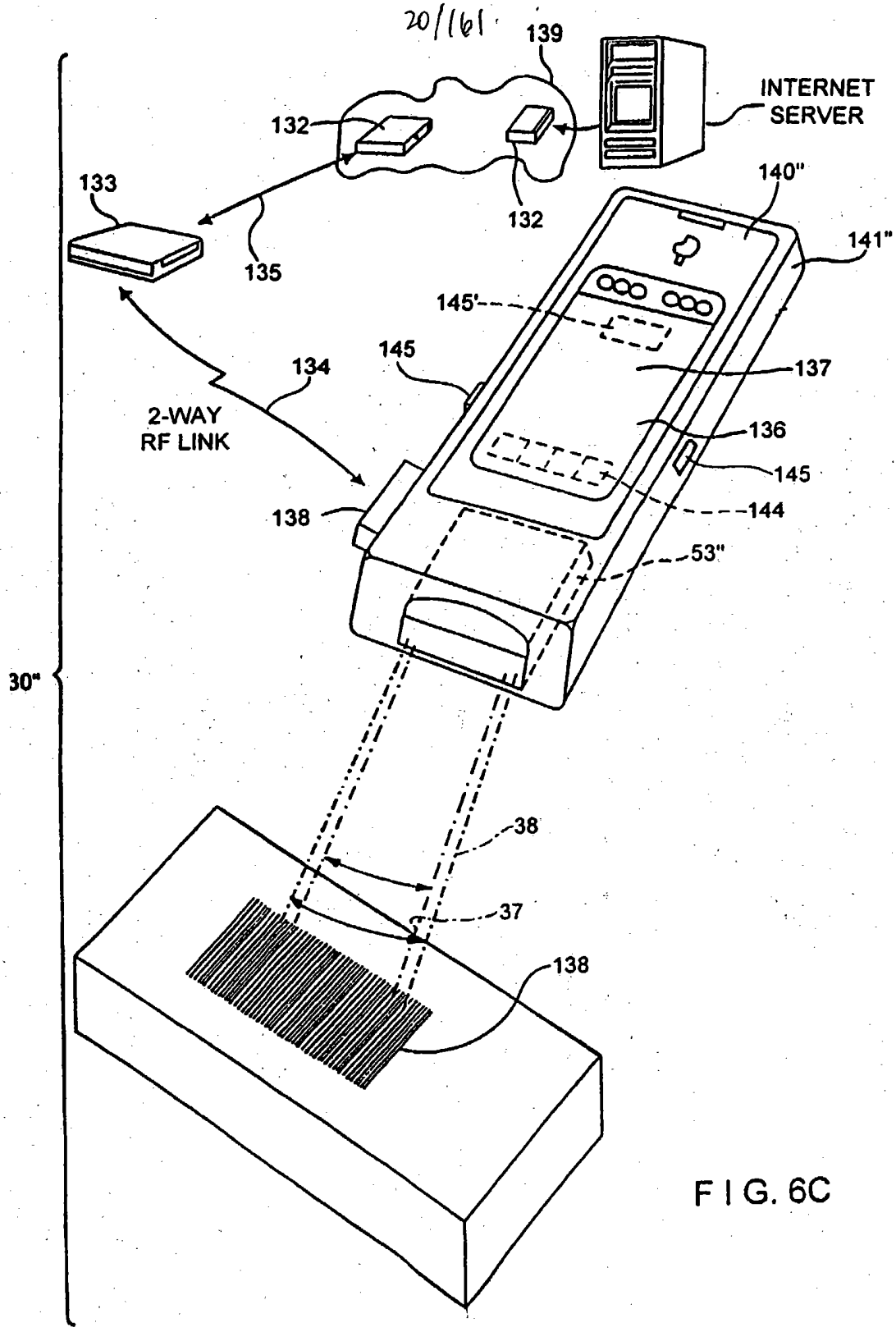

139
INTERNET SERVER
132
132
133
135
140"
141"
145'
145
134
137
2-WAY RF LINK
136
145
138
144
53"
30"
38
37
138

FIG. 6C

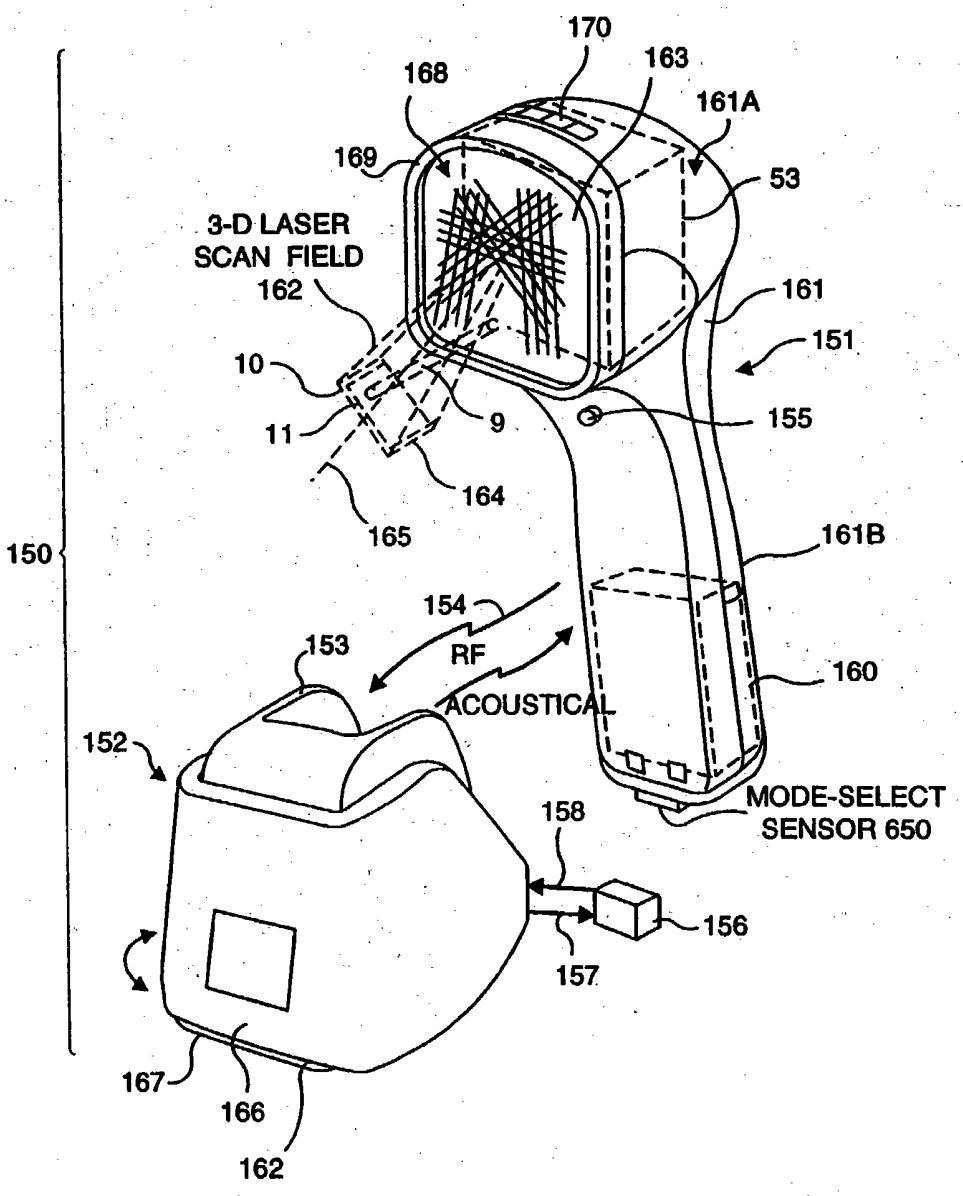

170
163
168
161A
169
53
3-D LASER
SCAN FIELD
162
161
151
10
155
11
9
164
165
150
161B
154
153
RF
ACOUSTICAL
160
152
MODE-SELECT
SENSOR 650
158
156
157
167
166
162

FIG. 7A

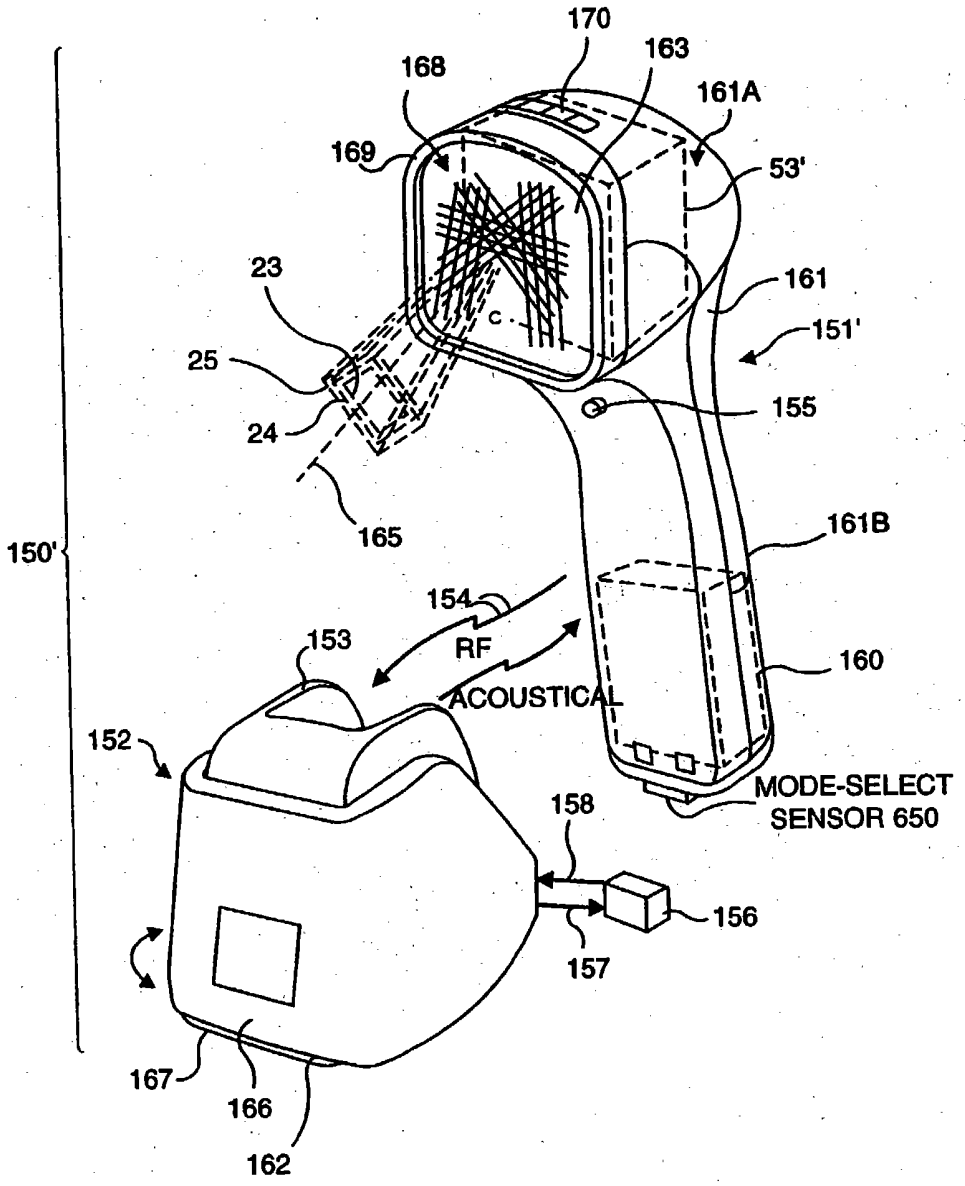

170
163
168
161A
169
53'
23
161
151'
25
155
24
165
161B
150'
154
RF
153
ACOUSTICAL
160
152
MODE-SELECT
SENSOR 650
158
156
157
167
166
162

FIG. 7B

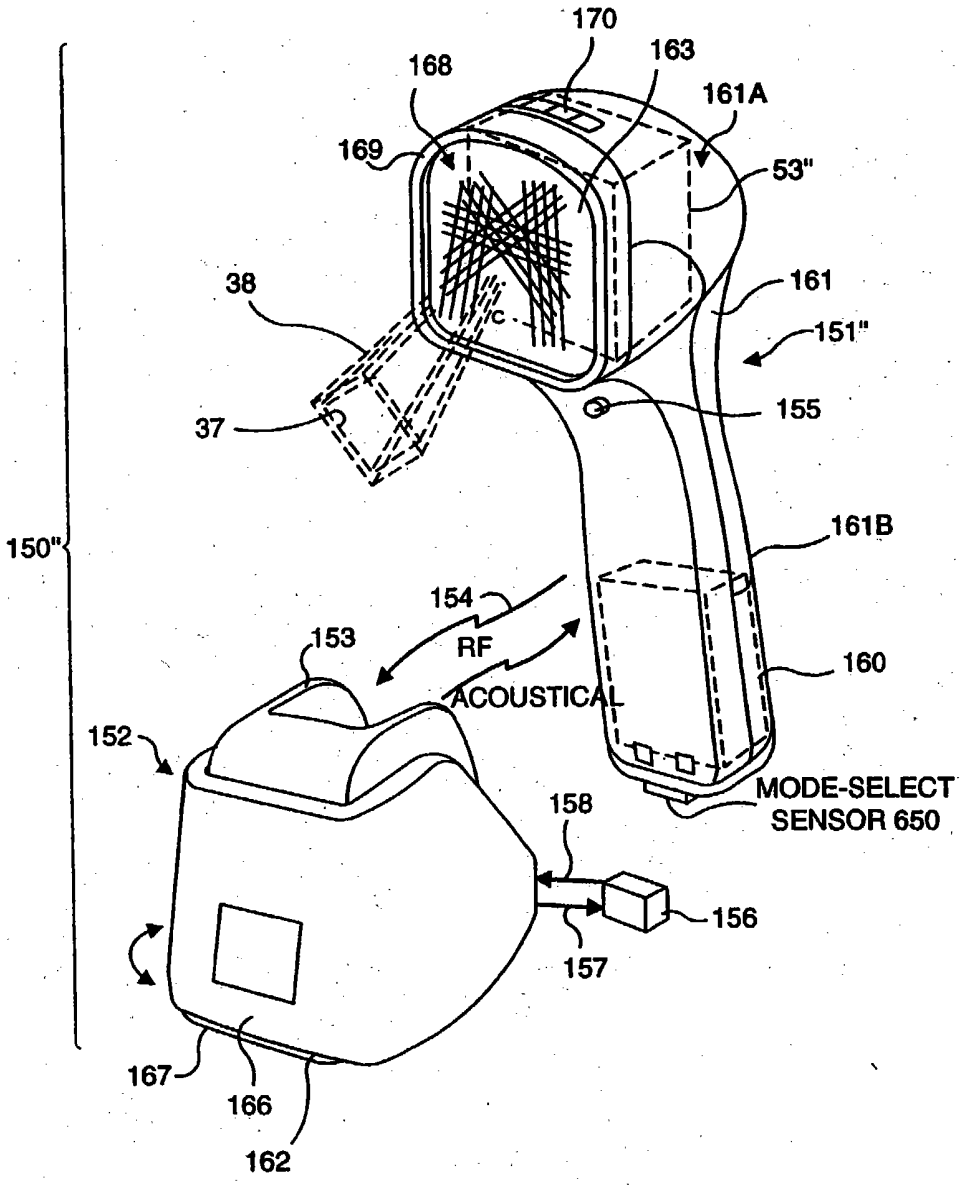

170
163
168
161A
169
53"
38
161
151"
37
155
150"
161B
154
153
RF
ACOUSTICAL
160
152
MODE-SELECT
SENSOR 650
158
156
157
167
166
162

FIG. 7C

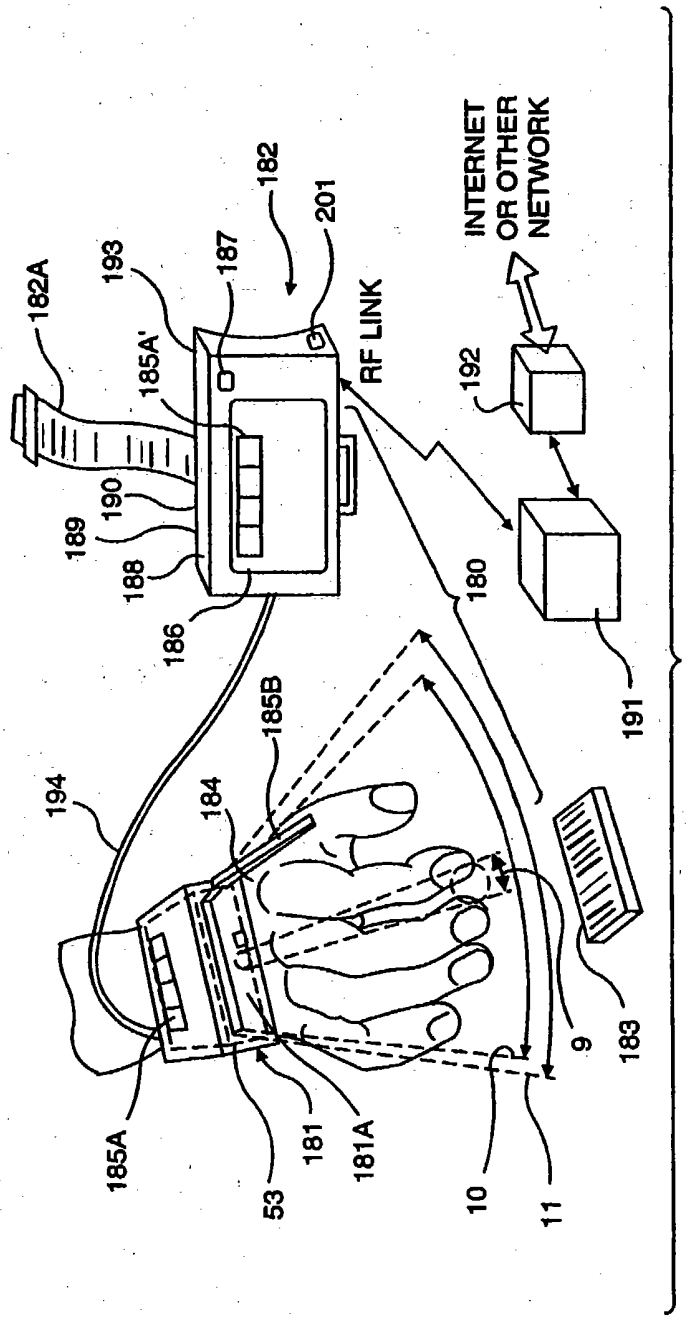

182A
193
187
182
201
185A'
INTERNET
OR OTHER
NETWORK
RF LINK
192
190
189
188
186
180
185B
194
184
191
185A
181
181A
53
10
11
9
183

FIG. 8A

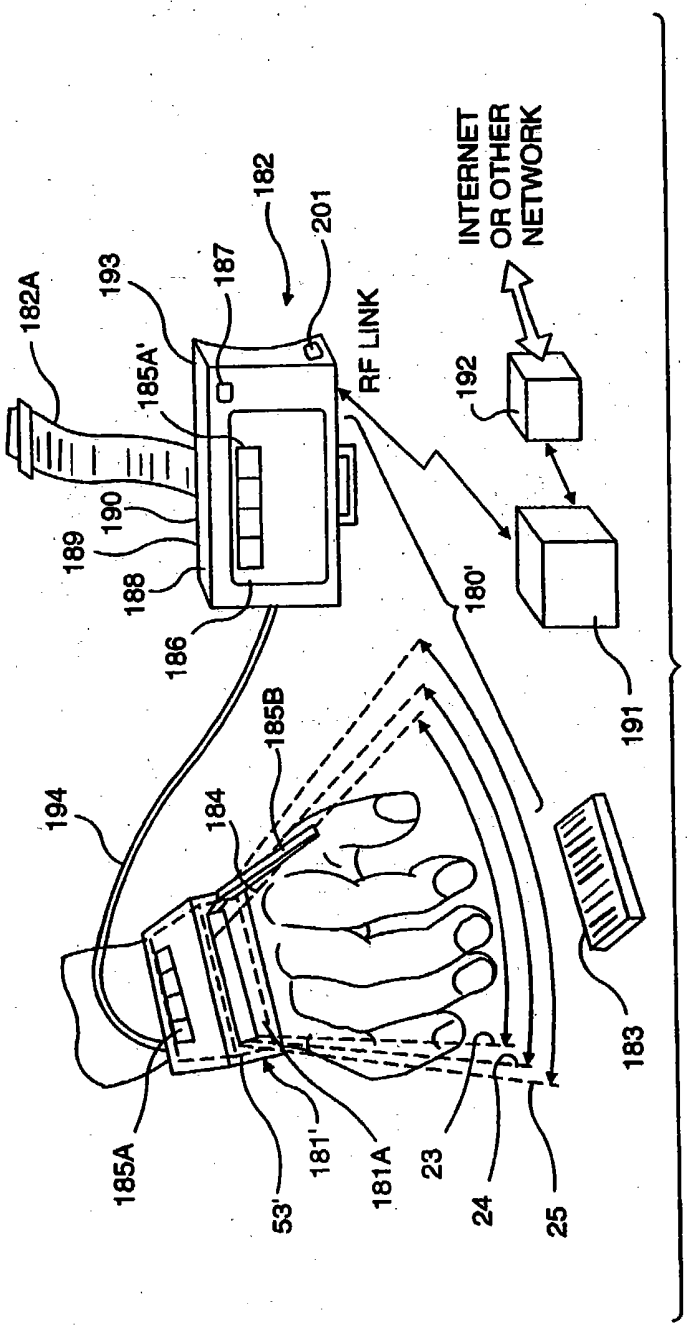

182A
193
187
182
201
185A'
INTERNET OR OTHER NETWORK
RF LINK
192
190
189
188
186
180'
191
185B
194
184
183
185A
181'
181A
23
24
25
53'

FIG. 8B

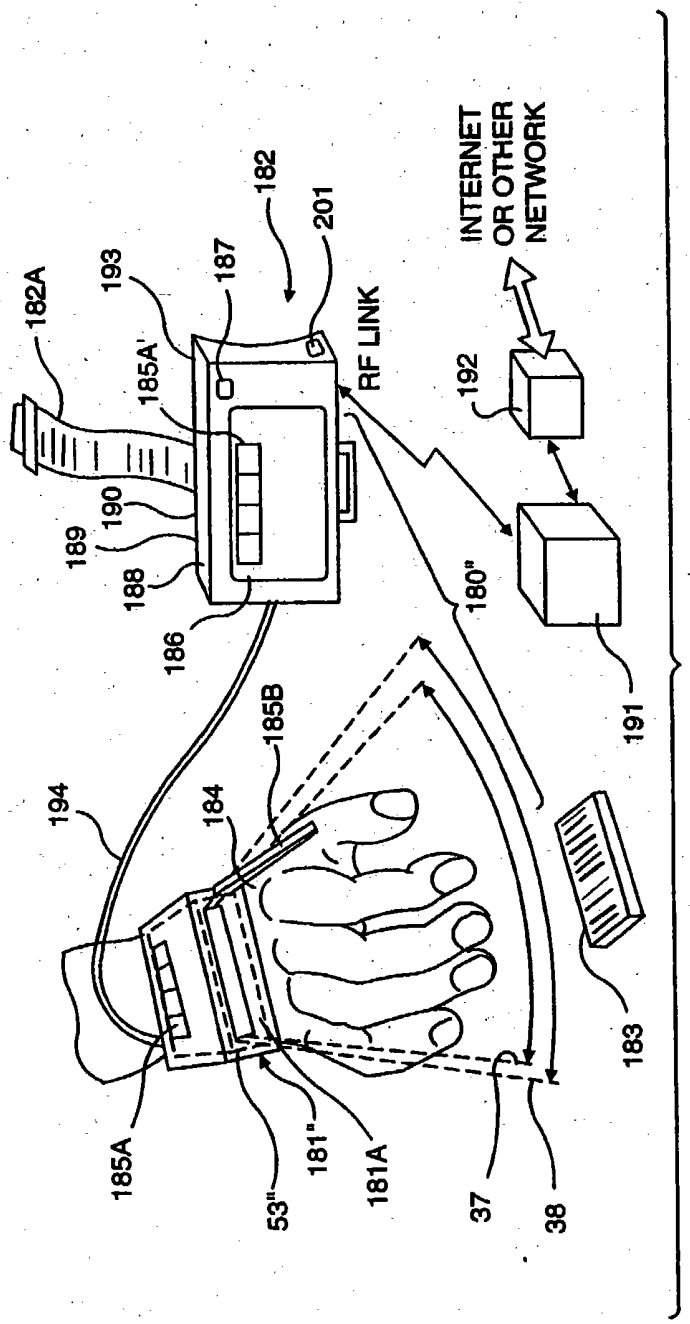

182A
193
187
182
201
185A'
RF LINK
INTERNET
OR OTHER
NETWORK
192
190
189
188
186
180"
191
194
184
185B
183
185A
53"
181"
181A
37
38

FIG. 8C

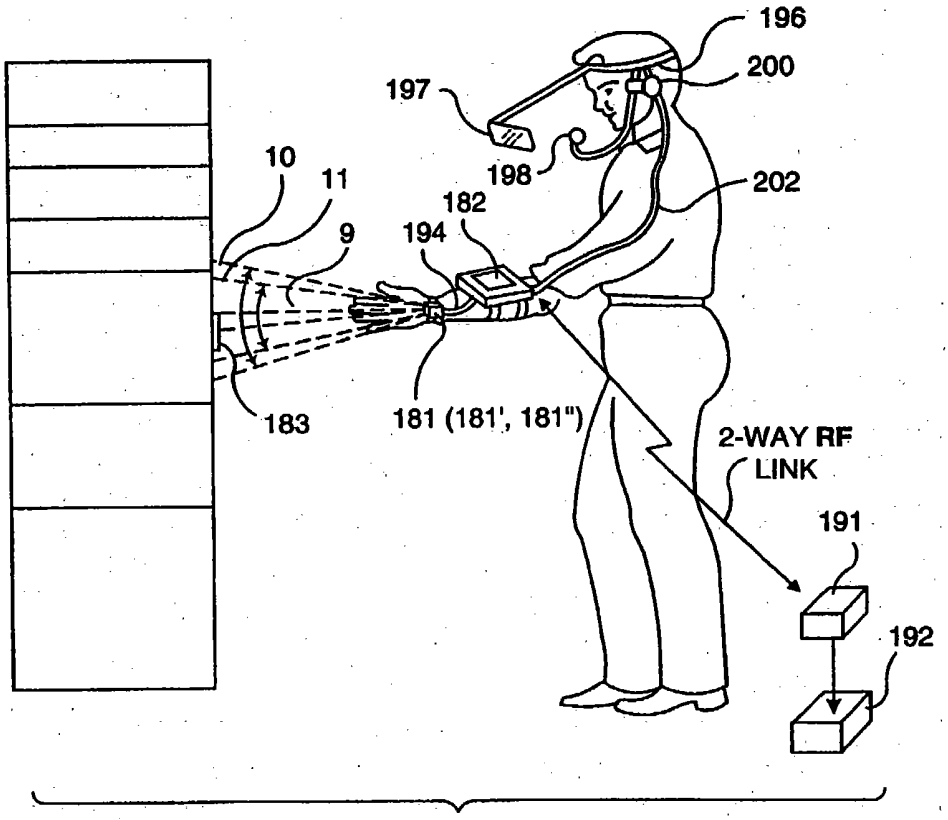

196
200
197
198
202
182
194
10
11
9
183
181 (181', 181")
2-WAY RF
LINK
191
192

FIG. 8D

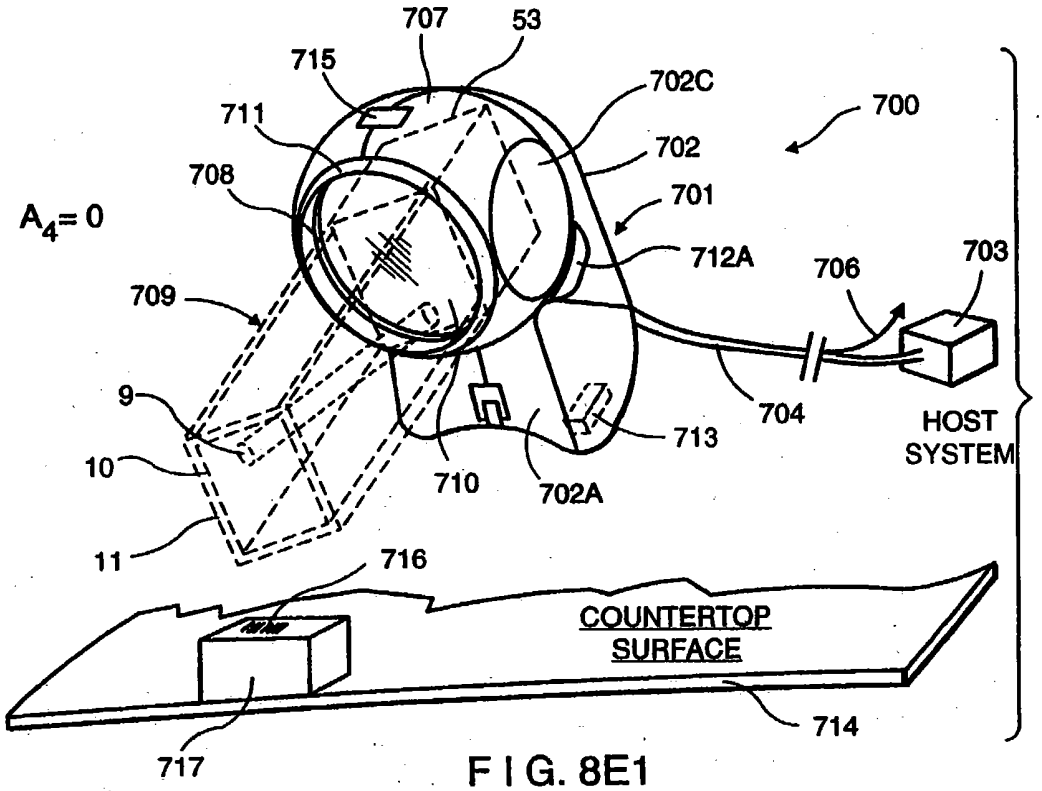


FIG. 8E1

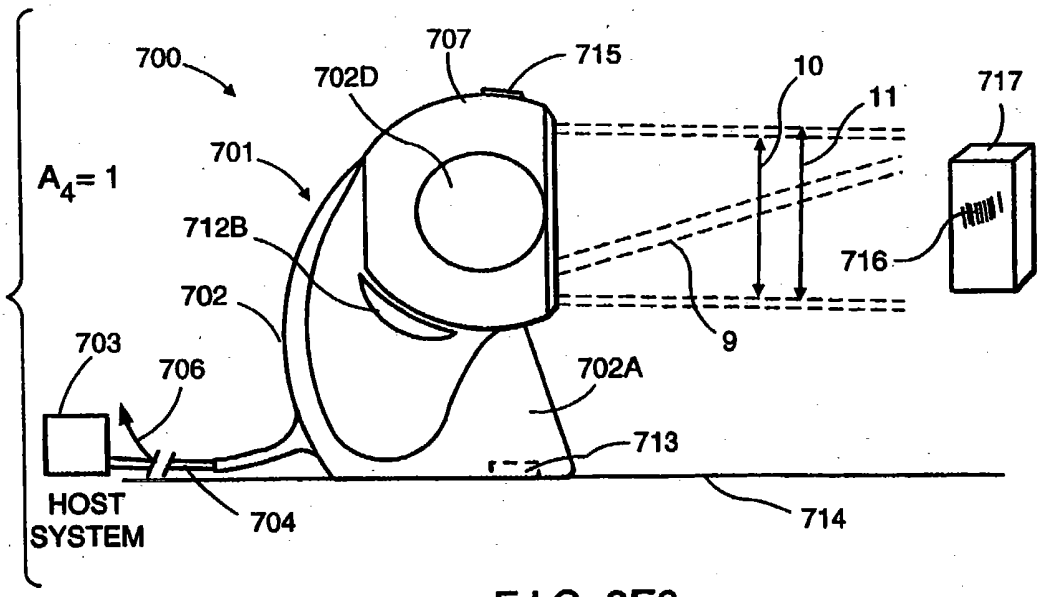


FIG. 8E2

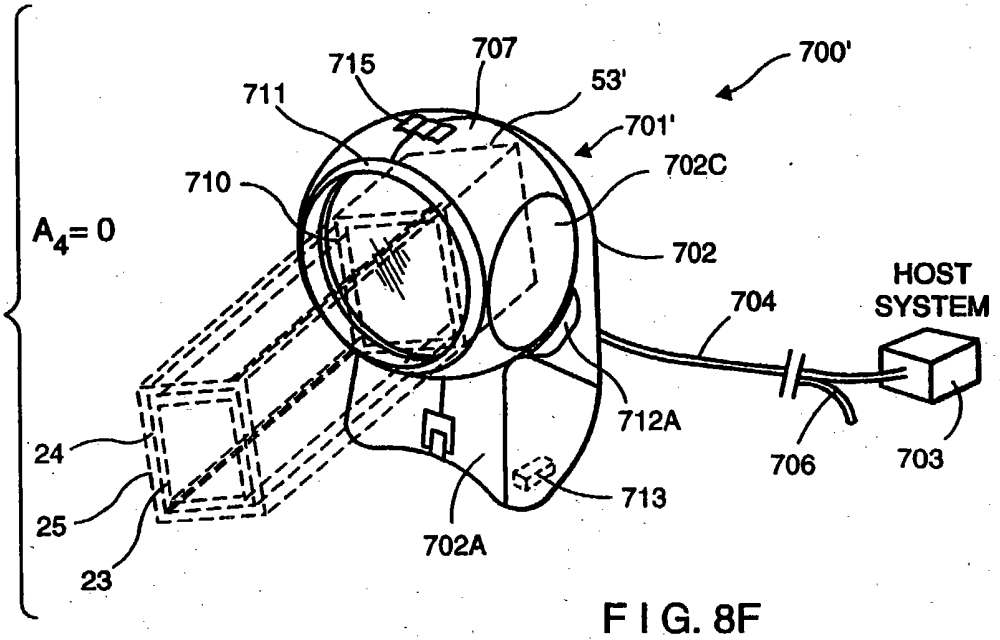

700'
715
707
711
53'
701'
710
702C
$A_4 = 0$
702
HOST SYSTEM
704
712A
24
706
703
25
713
23
702A

FIG. 8F

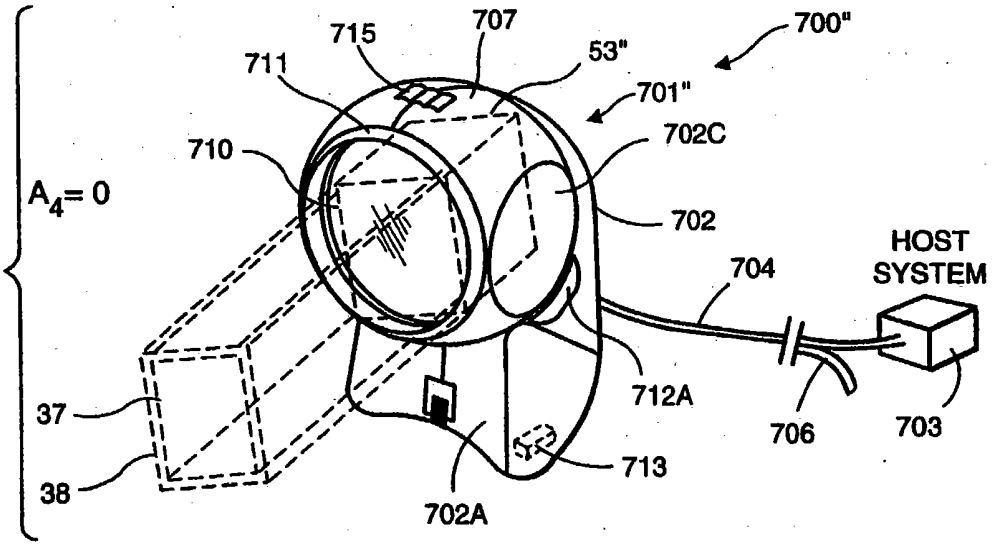

700"
715
707
711
53"
701"
710
702C
$A_4 = 0$
702
HOST SYSTEM
704
712A
37
706
703
713
38
702A

FIG. 8G

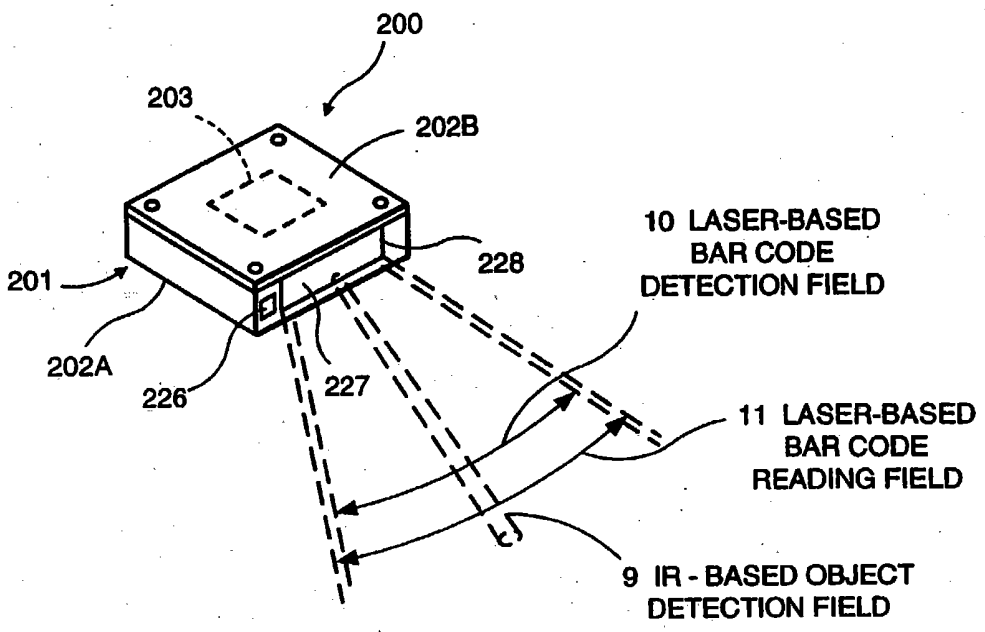

200
203
202B
228
10 LASER-BASED
BAR CODE
DETECTION FIELD
201
202A
226
227
11 LASER-BASED
BAR CODE
READING FIELD
9 IR - BASED OBJECT
DETECTION FIELD

FIG. 9A

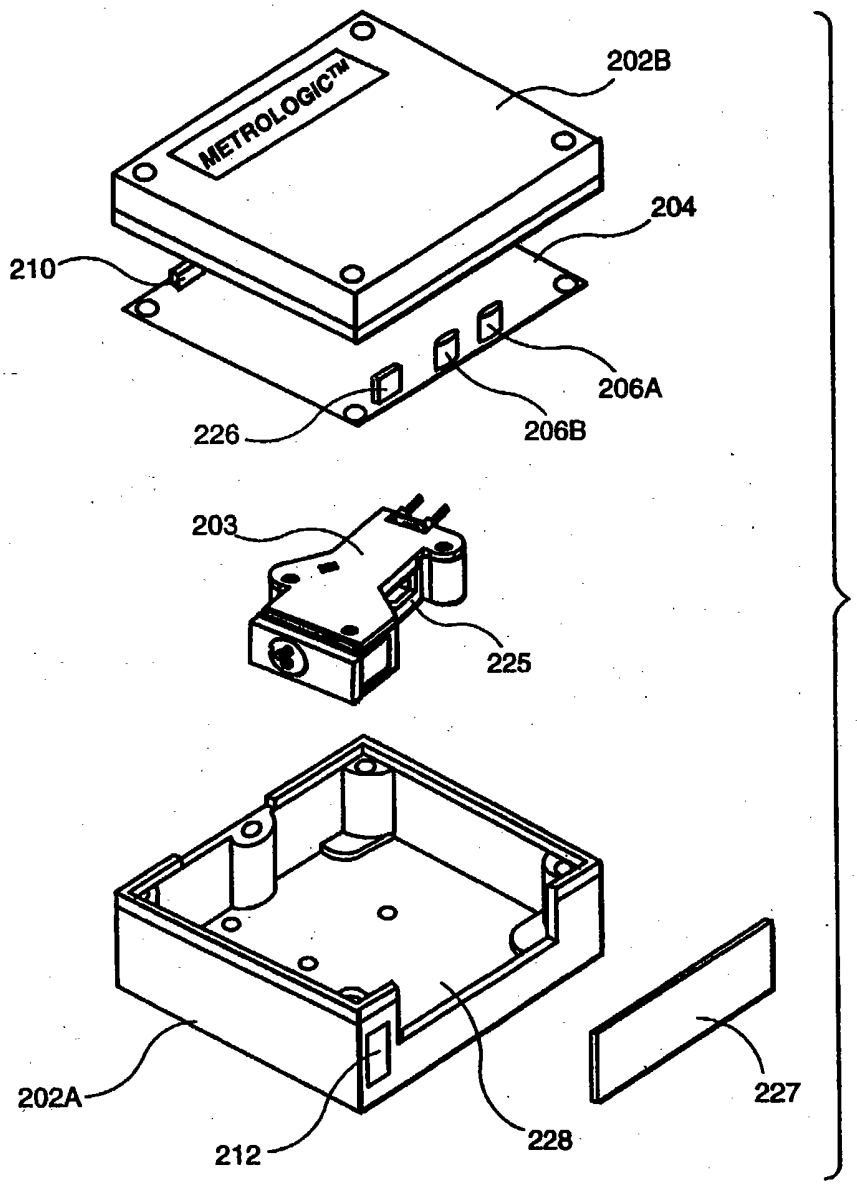

METROLOGIC™
202B
204
210
206A
206B
226
203
225
202A
212
228
227

FIG. 9B

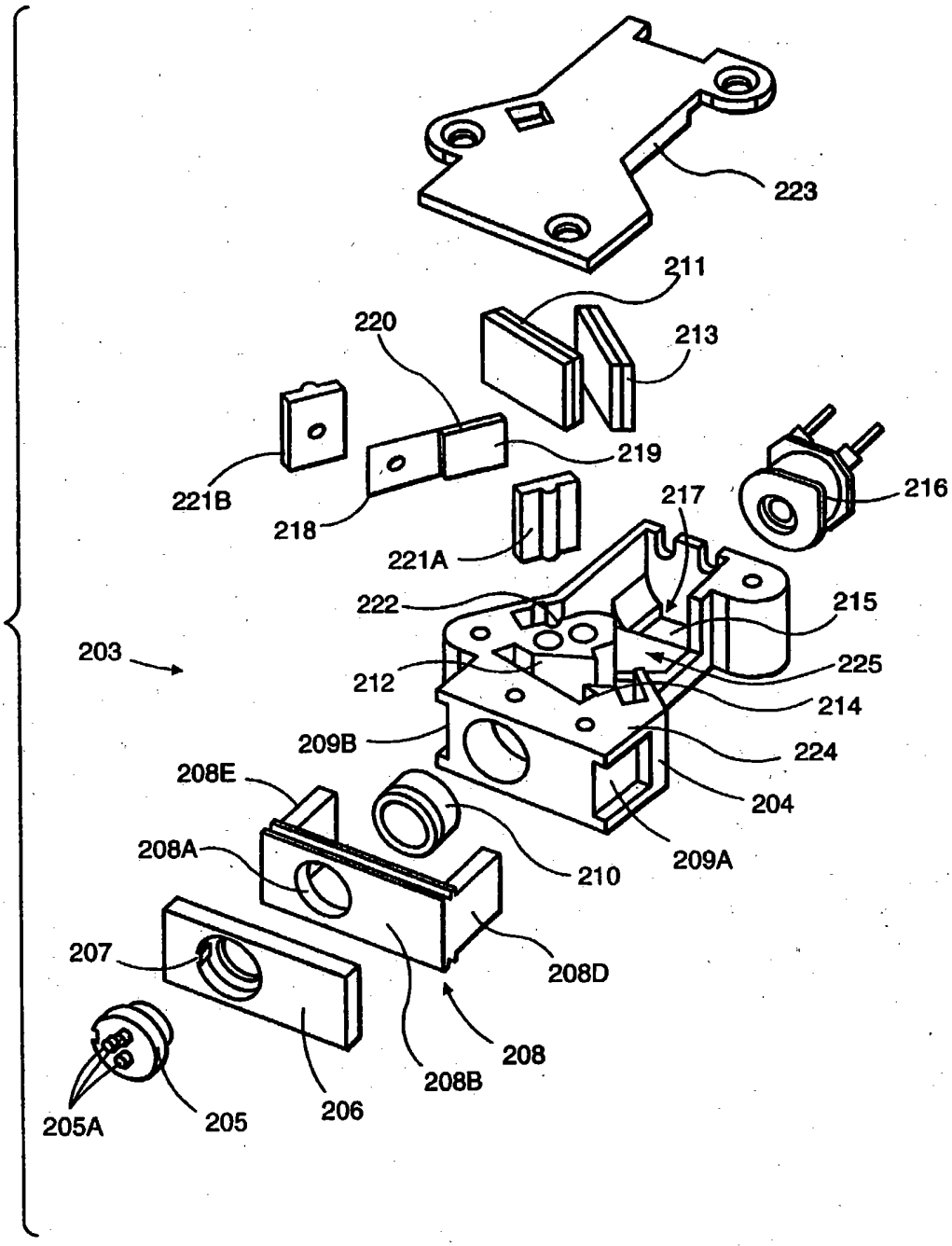

223
211
220
213
219
221B
218
216
217
221A
222
215
203
225
212
214
209B
224
208E
204
208A
210
209A
207
208D
208
208B
205A
205
206

FIG. 9C

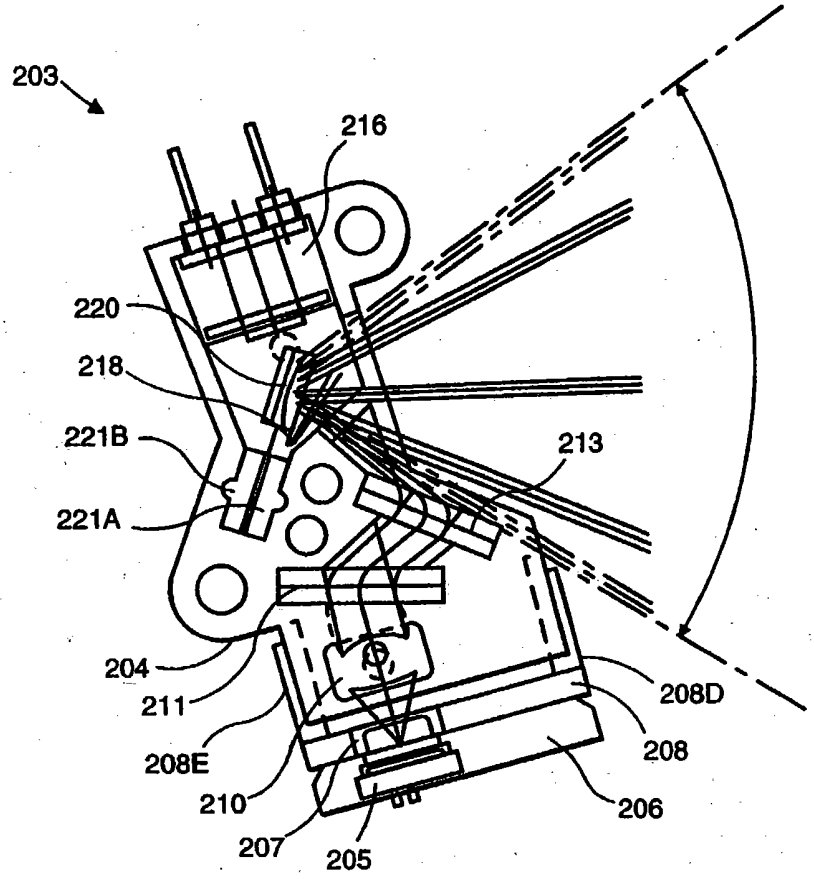

203
216
220
218
221B
221A
213
204
211
208E
210
207
205
208D
208
206

FIG. 9D

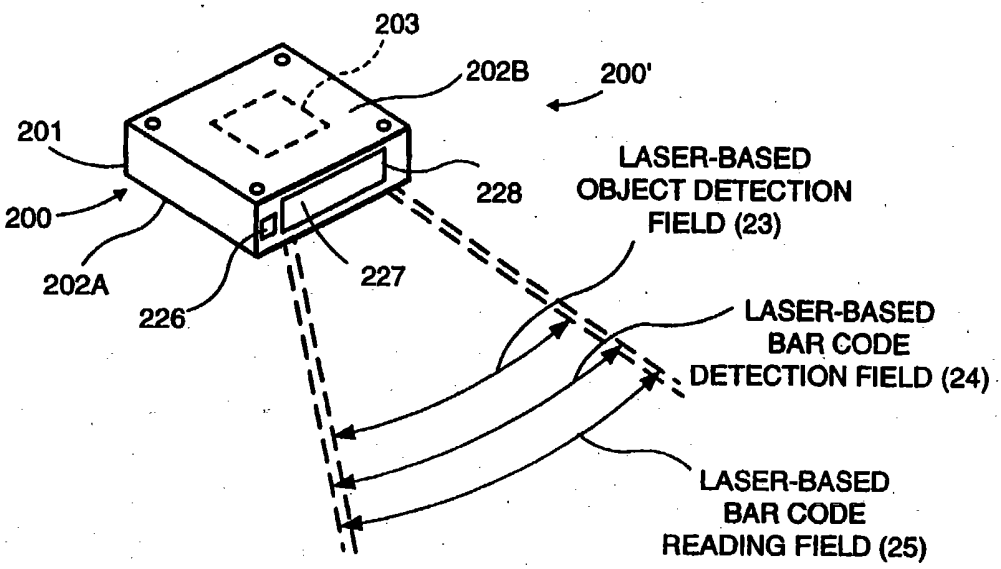

203
202B
200'
201
228
LASER-BASED
OBJECT DETECTION
FIELD (23)
200
202A
226
227
LASER-BASED
BAR CODE
DETECTION FIELD (24)
LASER-BASED
BAR CODE
READING FIELD (25)

FIG. 9E

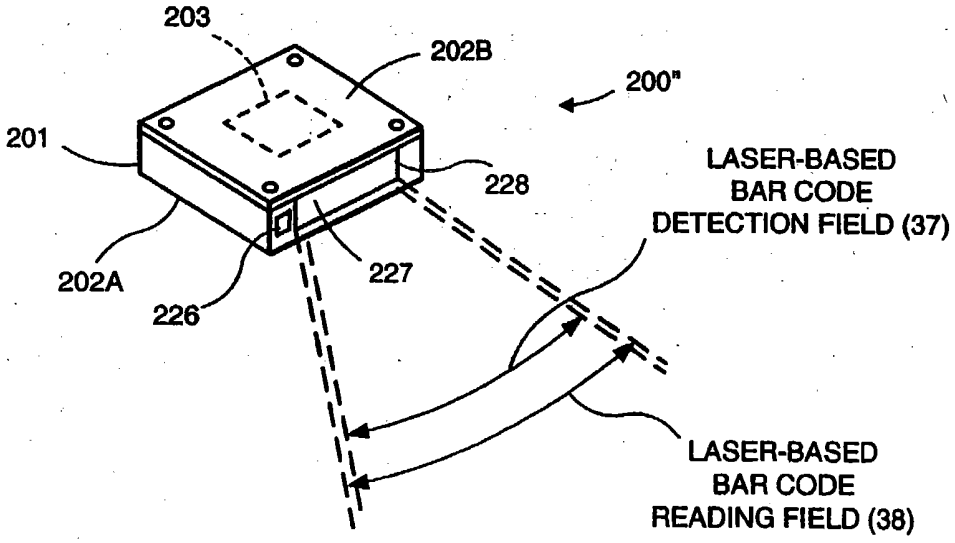

203
202B
200"
201
228
LASER-BASED
BAR CODE
DETECTION FIELD (37)
202A
226
227
LASER-BASED
BAR CODE
READING FIELD (38)

FIG. 9F

FIG. 10A

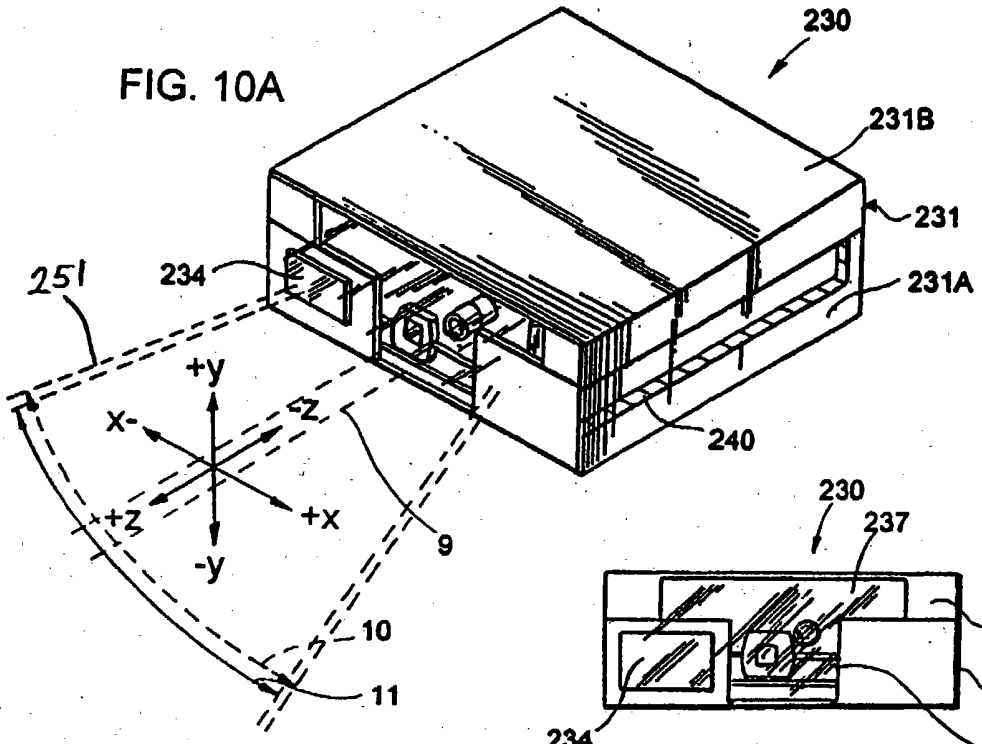


FIG. 10B

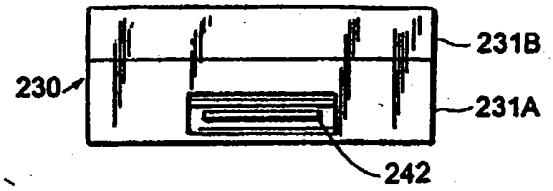


FIG. 10C

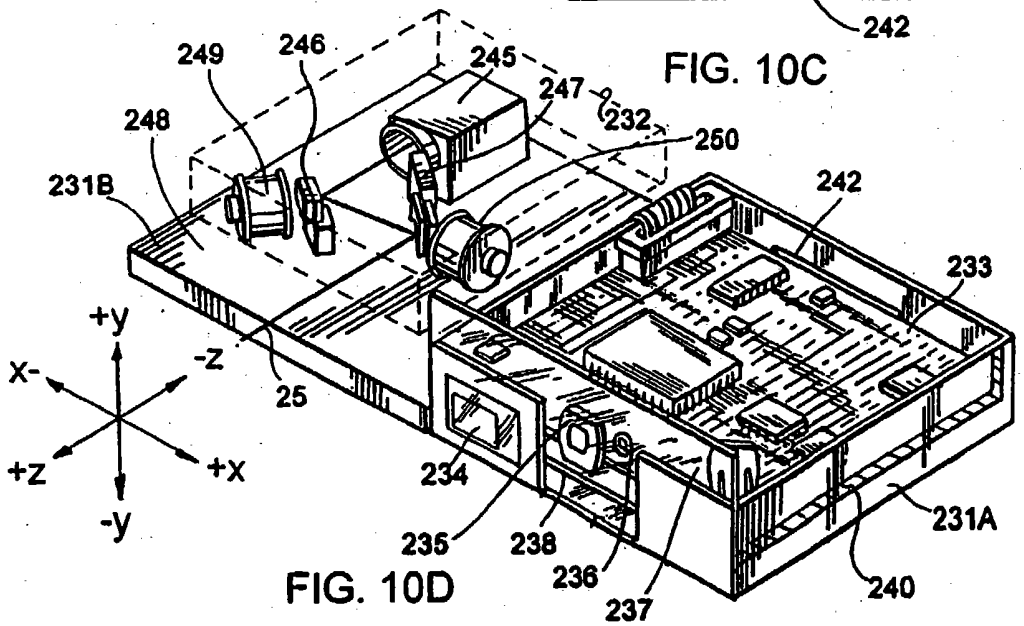


FIG. 10D

FIG. 10E

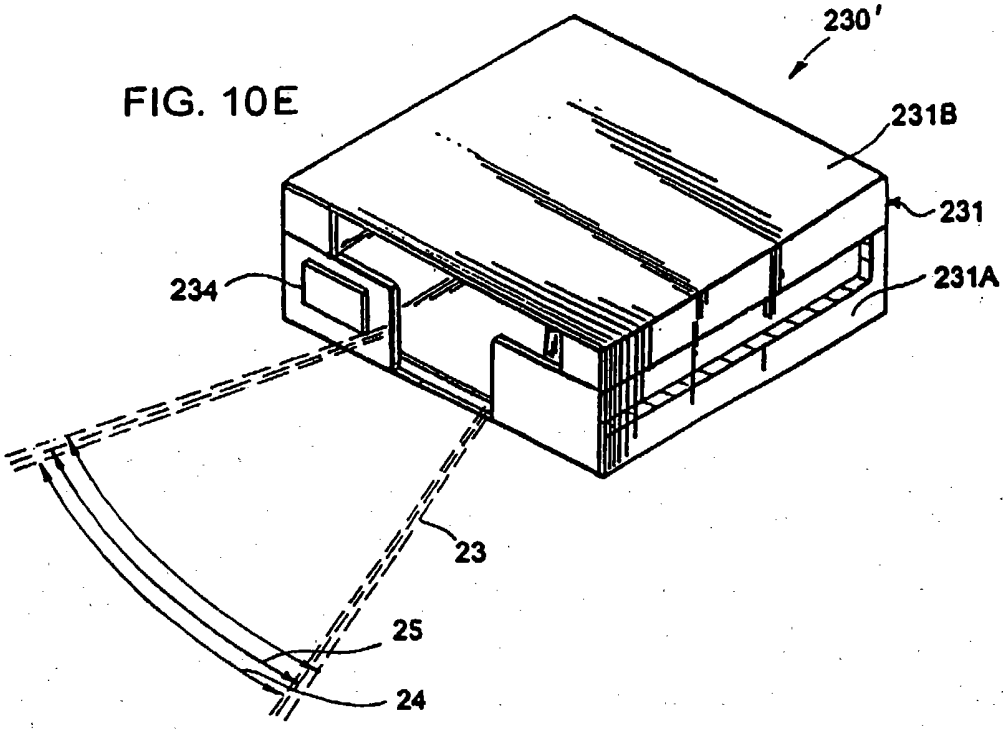
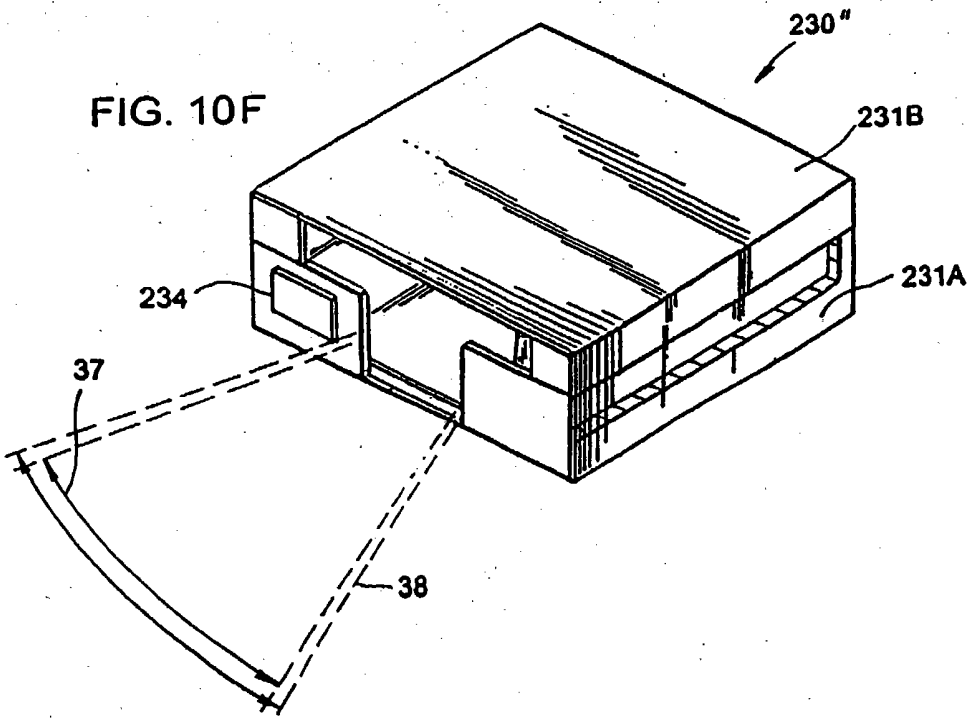


FIG. 10F



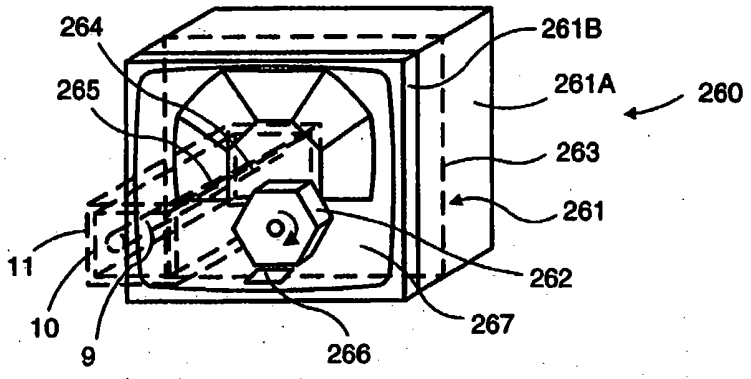


FIG. 11A

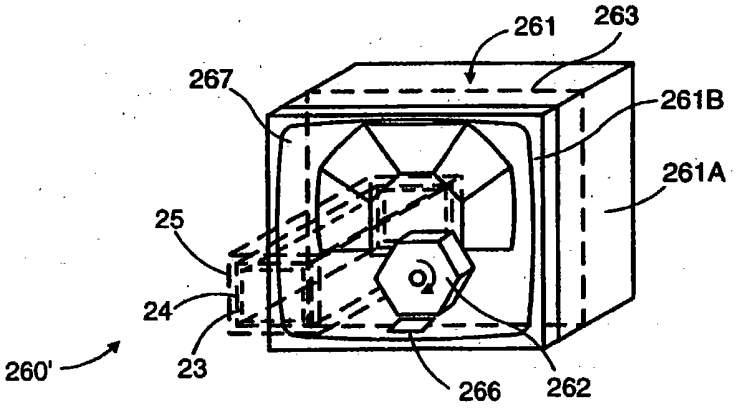


FIG. 11B

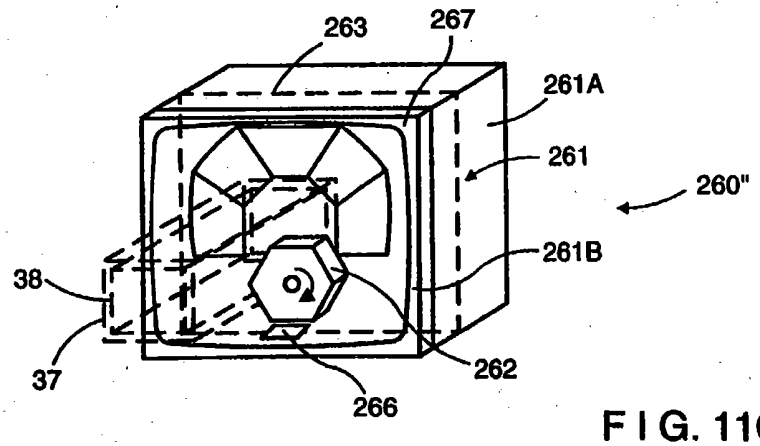


FIG. 11C

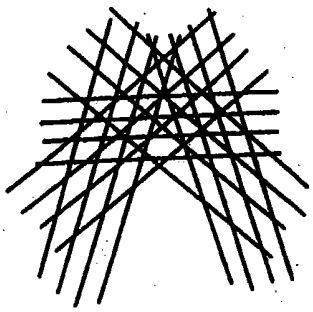


FIG. 12A

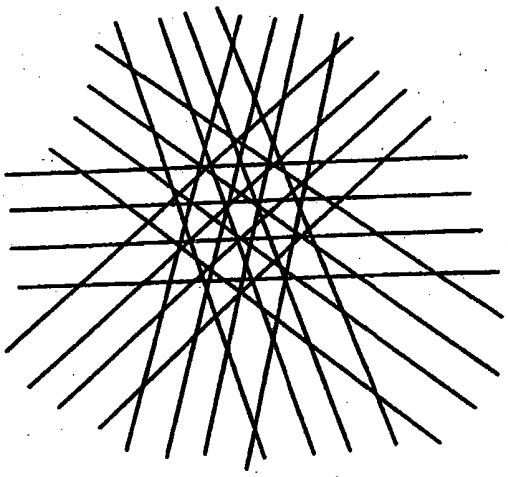


FIG. 12B

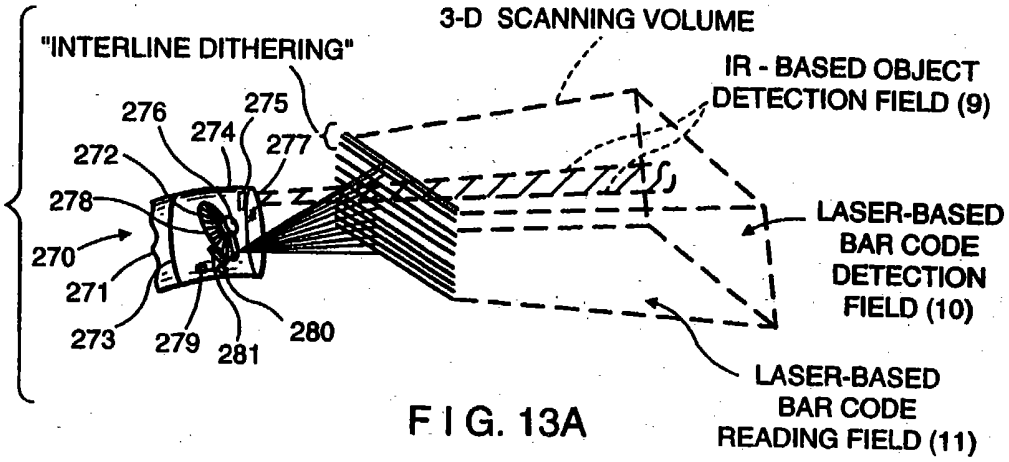


FIG. 13A

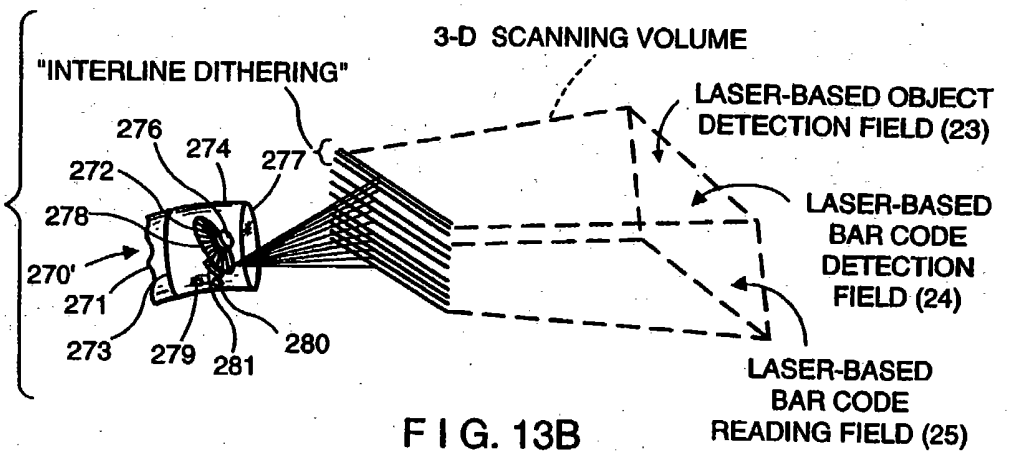


FIG. 13B

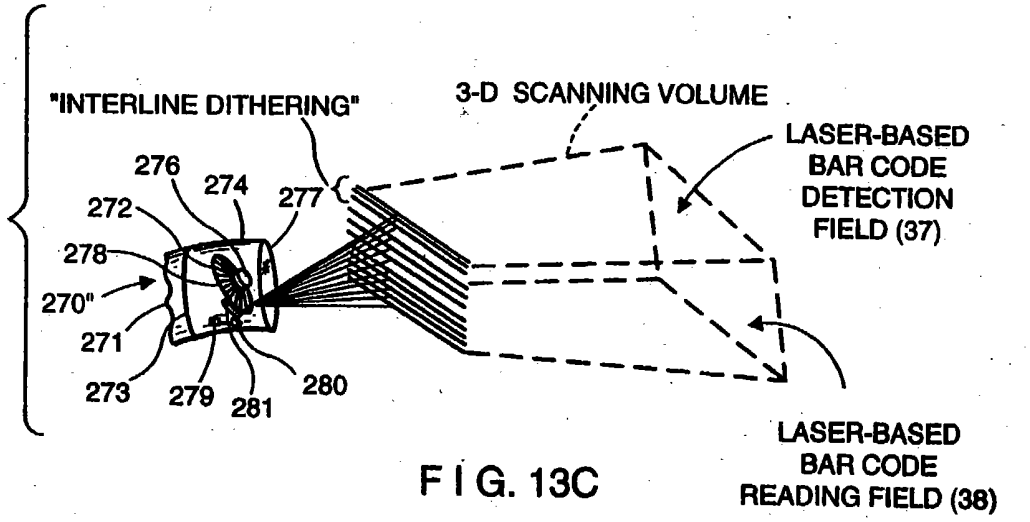


FIG. 13C

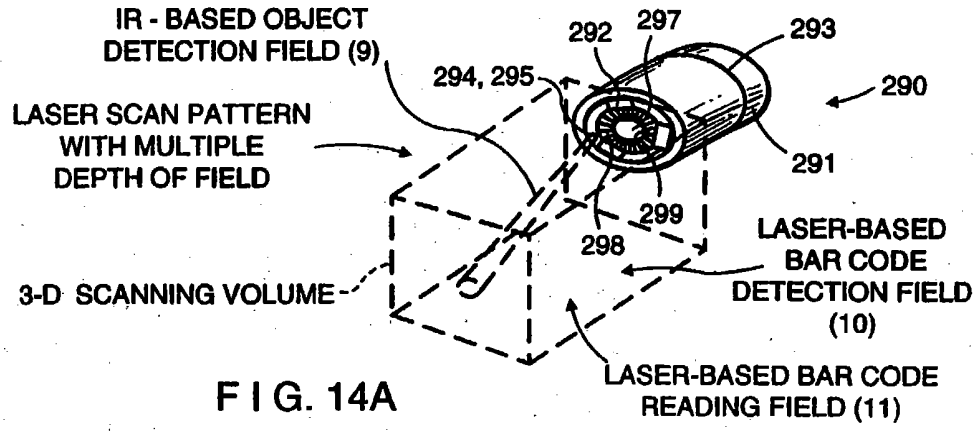


FIG. 14A

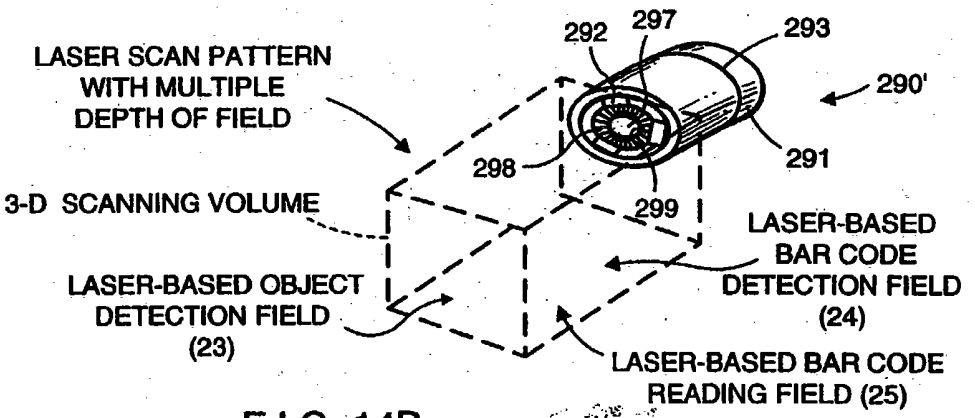


FIG. 14B

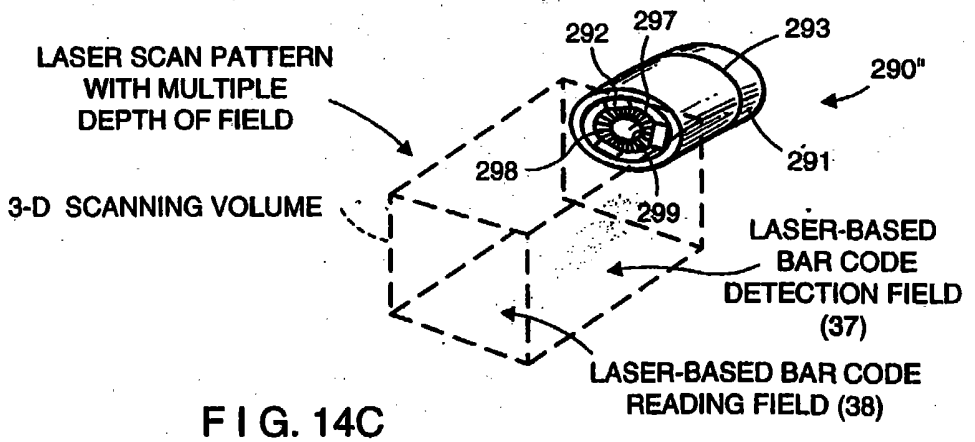


FIG. 14C

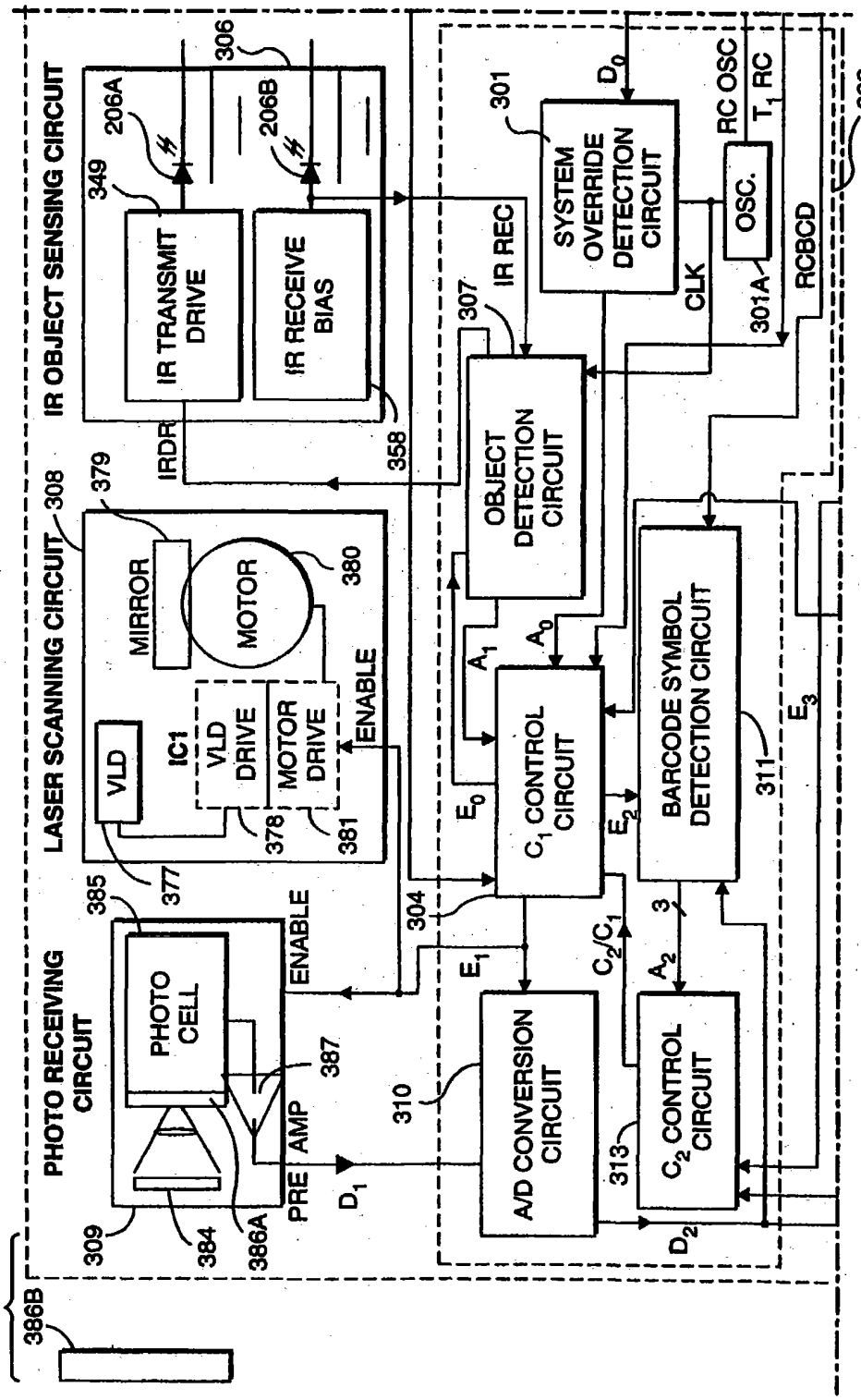


PHOTO RECEIVING CIRCUIT
LASER SCANNING CIRCUIT
IR OBJECT SENSING CIRCUIT
PHOTO CELL
AMP
PRE
ENABLE
VLD
IC1
VLD DRIVE
MOTOR DRIVE
MIRROR
MOTOR
IR TRANSMIT DRIVE
IR RECEIVE BIAS
IRDR
IR REC
OBJECT DETECTION CIRCUIT
SYSTEM OVERRIDE DETECTION CIRCUIT
OSC.
RC OSC
CLK
RCBCD
A/D CONVERSION CIRCUIT
C1 CONTROL CIRCUIT
C2 CONTROL CIRCUIT
BARCODE SYMBOL DETECTION CIRCUIT
309
384
386A
386B
385
377
387
310
304
308
379
380
378
381
349
206A
206B
306
358
307
301
301A
333
311
313

FIG. 15A1

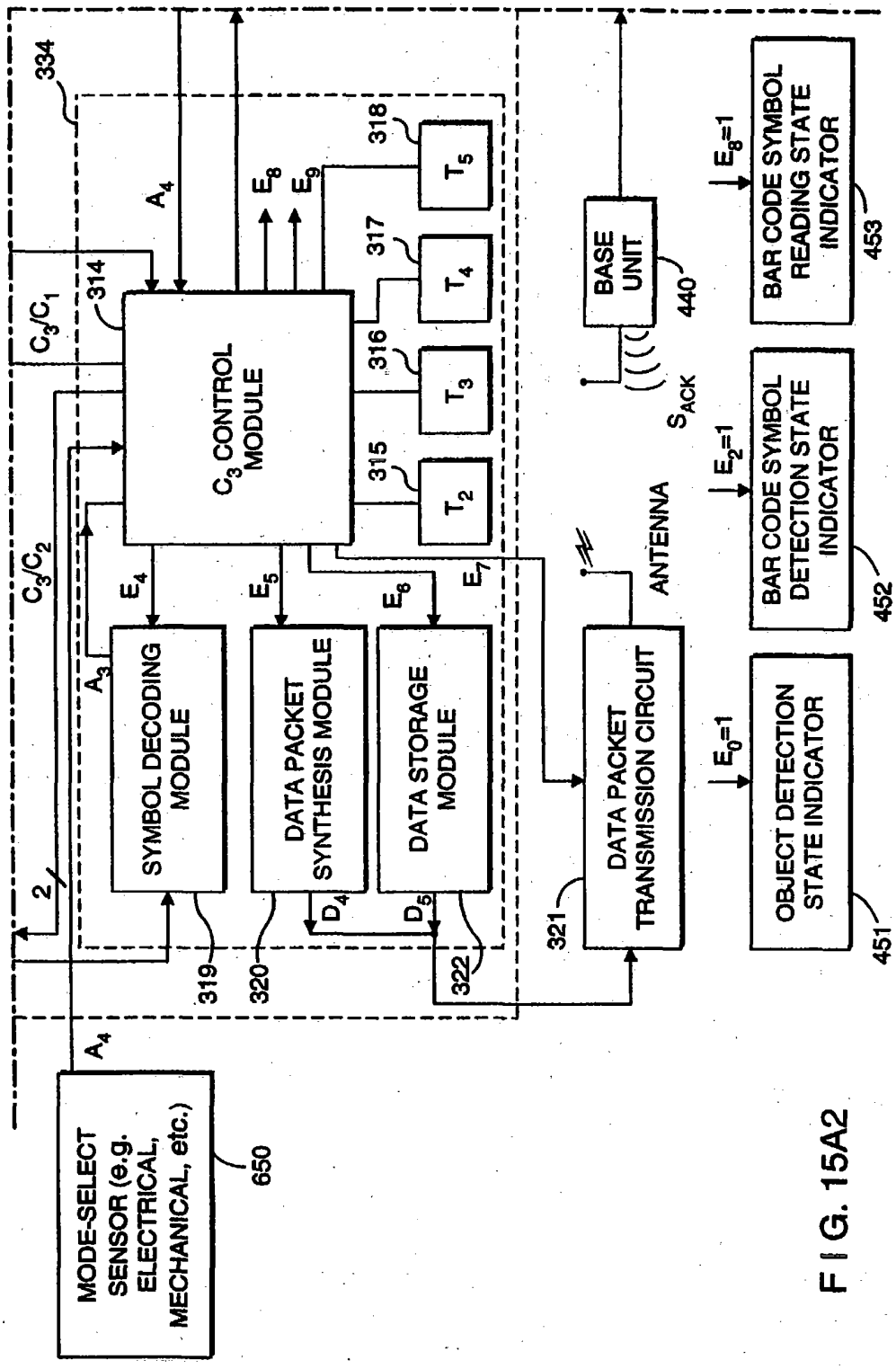

MODE-SELECT SENSOR (e.g. ELECTRICAL, MECHANICAL, etc.)
650
A4
334
C3/C1
C3/C2
2
314
C3 CONTROL MODULE
A4
E8
E9
318
317
316
315
T5
T4
T3
T2
E4
E5
E6
E7
A3
SYMBOL DECODING MODULE
DATA PACKET SYNTHESIS MODULE
DATA STORAGE MODULE
D4
D5
319
320
322
321
DATA PACKET TRANSMISSION CIRCUIT
ANTENNA
BASE UNIT
440
SACK
E0=1
OBJECT DETECTION STATE INDICATOR
451
E2=1
BAR CODE SYMBOL DETECTION STATE INDICATOR
452
E8=1
BAR CODE SYMBOL READING STATE INDICATOR
453

FIG. 15A2

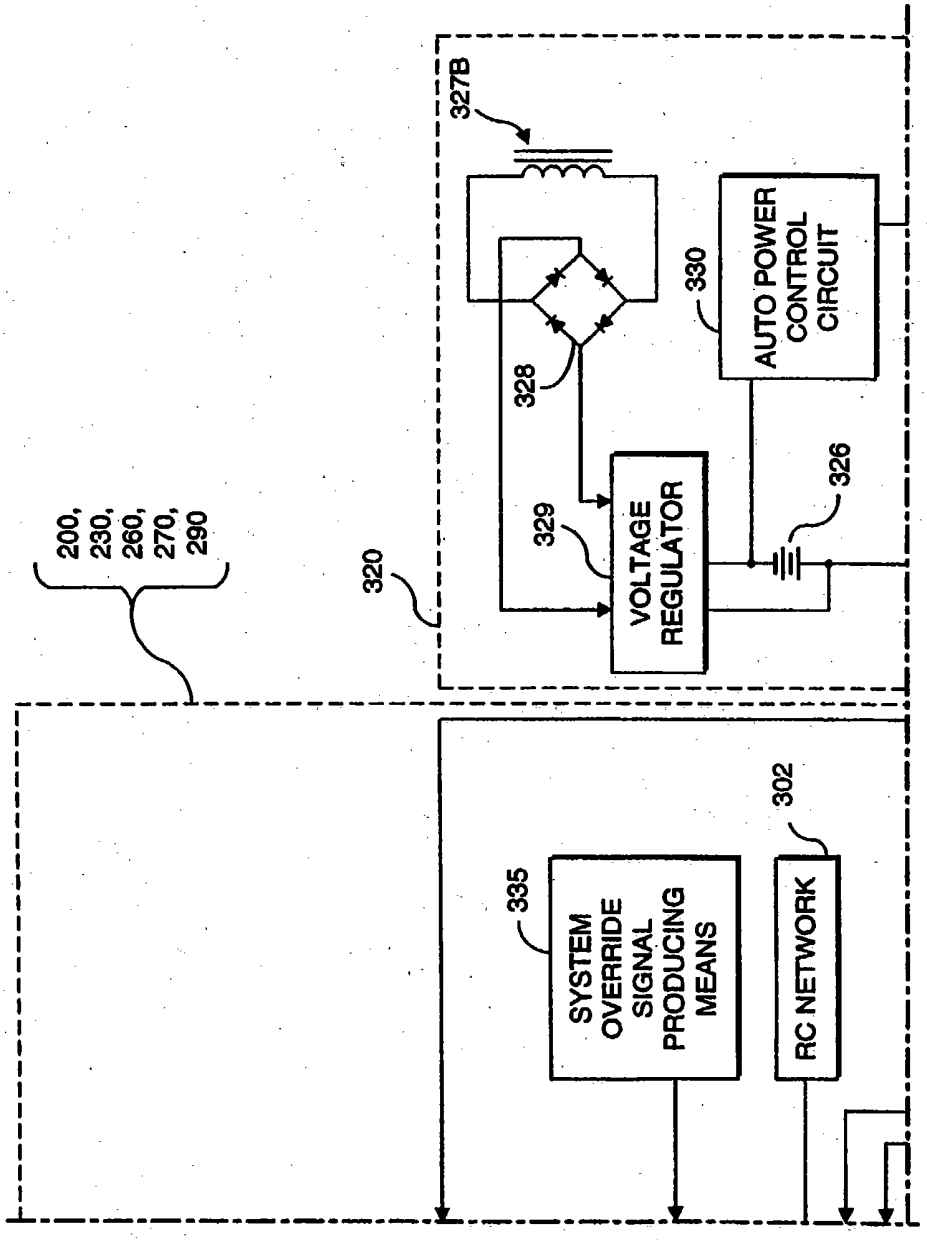

200, 230, 260, 270, 290
320
327B
328
329
326
330
AUTO POWER CONTROL CIRCUIT
VOLTAGE REGULATOR
335
SYSTEM OVERRIDE SIGNAL PRODUCING MEANS
302
RC NETWORK

FIG. 15A3

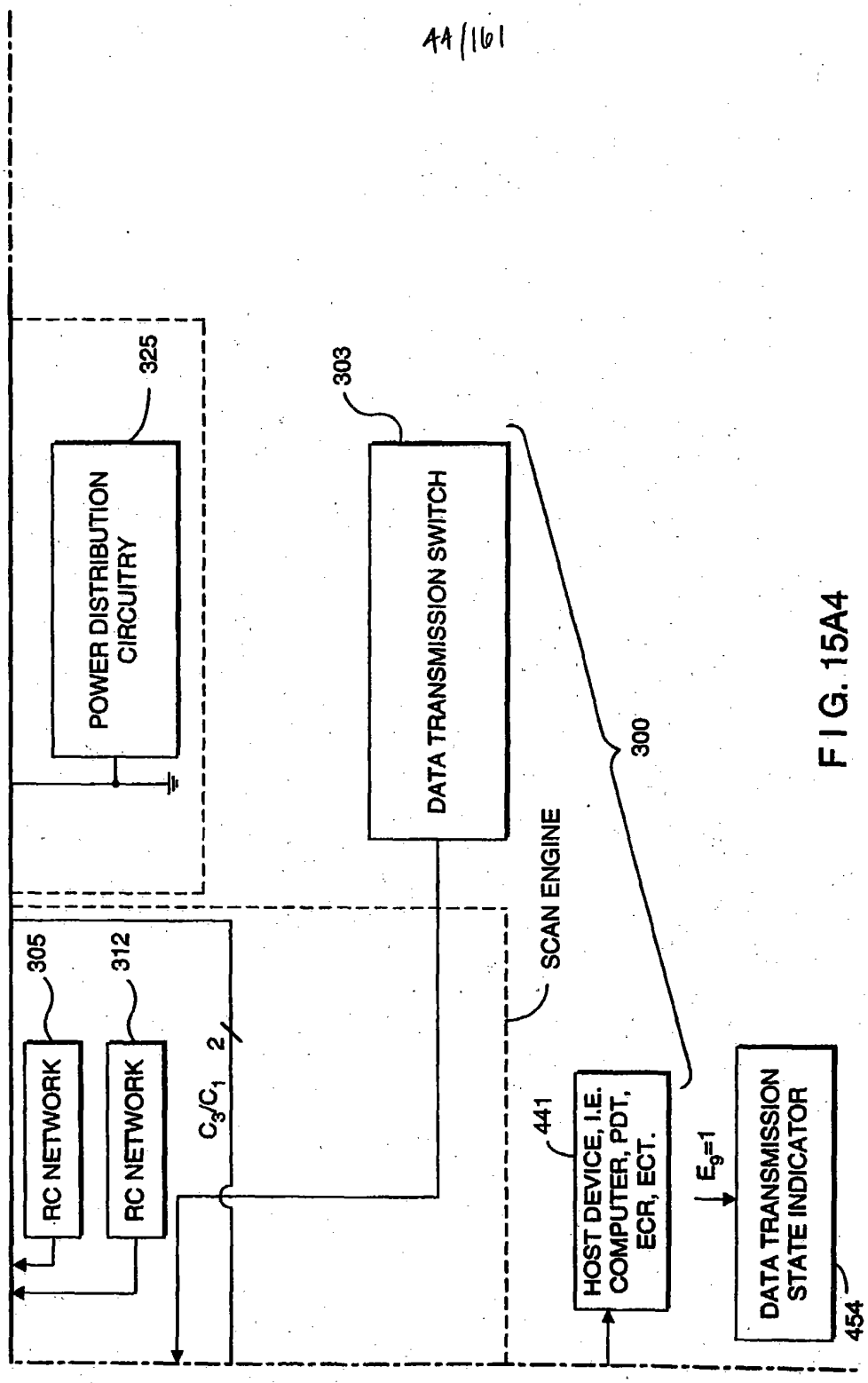

POWER DISTRIBUTION CIRCUITRY
325
303
DATA TRANSMISSION SWITCH
300
SCAN ENGINE
305
RC NETWORK
312
RC NETWORK
C_3/C_1 2
441
HOST DEVICE, I.E. COMPUTER, PDT, ECR, ECT.
E_g=1
DATA TRANSMISSION STATE INDICATOR
454

FIG. 15A4

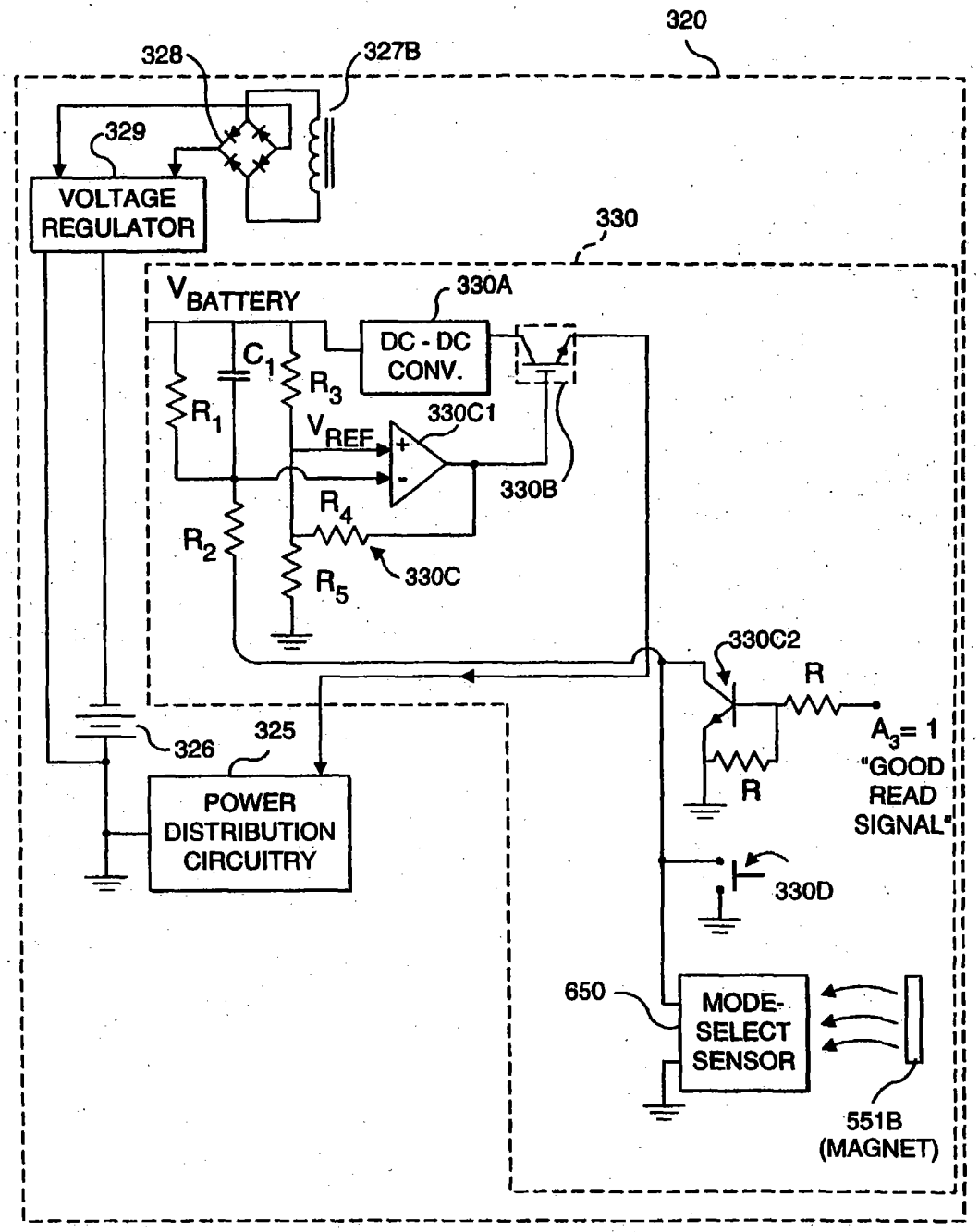

320
328
327B
329
VOLTAGE REGULATOR
330
$V_{BATTERY}$
330A
DC - DC CONV.
C_1
R_3
R_1
V_{REF}
330C1
330B
R_4
R_2
R_5
330C
330C2
R
R
A_3= 1 "GOOD READ SIGNAL"
326
325
POWER DISTRIBUTION CIRCUITRY
330D
650
MODE-SELECT SENSOR
551B (MAGNET)

FIG. 15B1

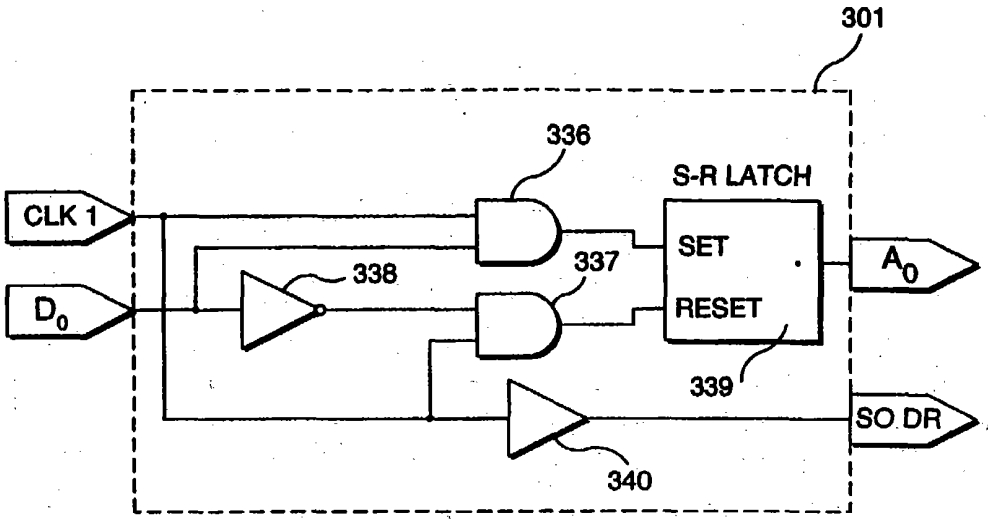


FIG. 15B2

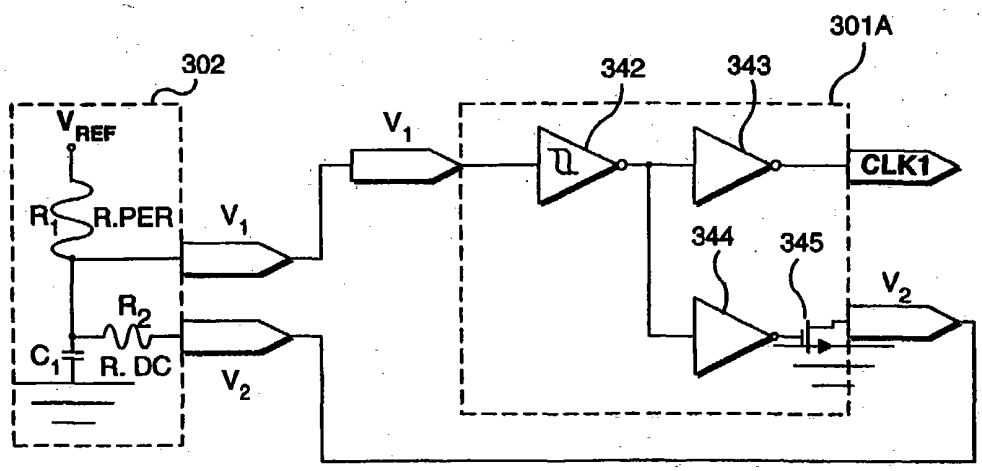


FIG. 15C

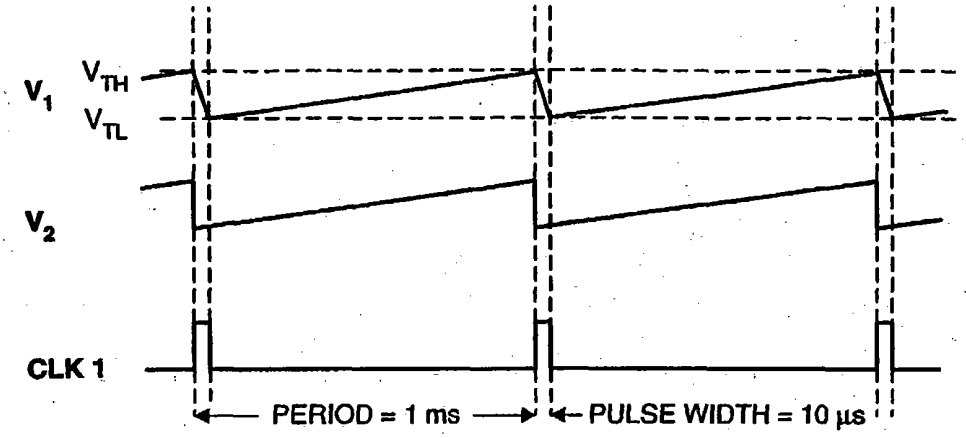


FIG. 15D

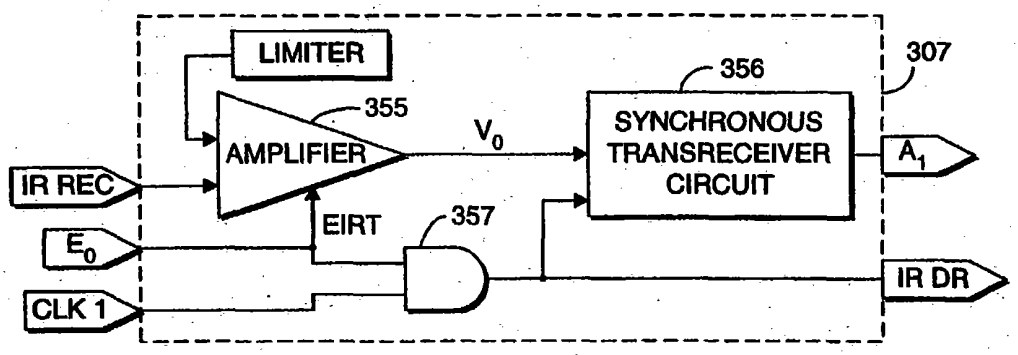


FIG. 15E

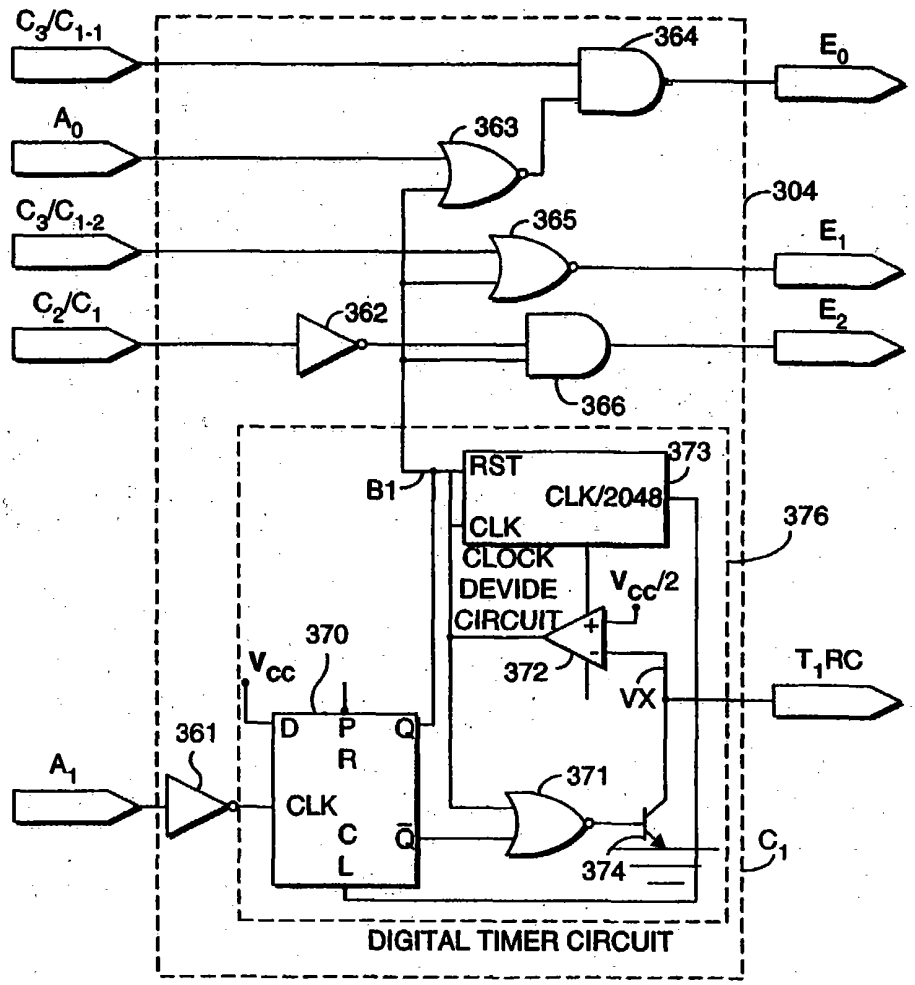

C3/C1-1
A0
C3/C1-2
C2/C1
A1
364
363
365
362
366
304
E0
E1
E2
373
RST
CLK/2048
CLK
CLOCK
DEVIDE
CIRCUIT
376
Vcc/2
372
VX
T1RC
B1
370
Vcc
361
D
P
R
Q
CLK
C
L
Q
371
374
C1
DIGITAL TIMER CIRCUIT

FIG. 15F

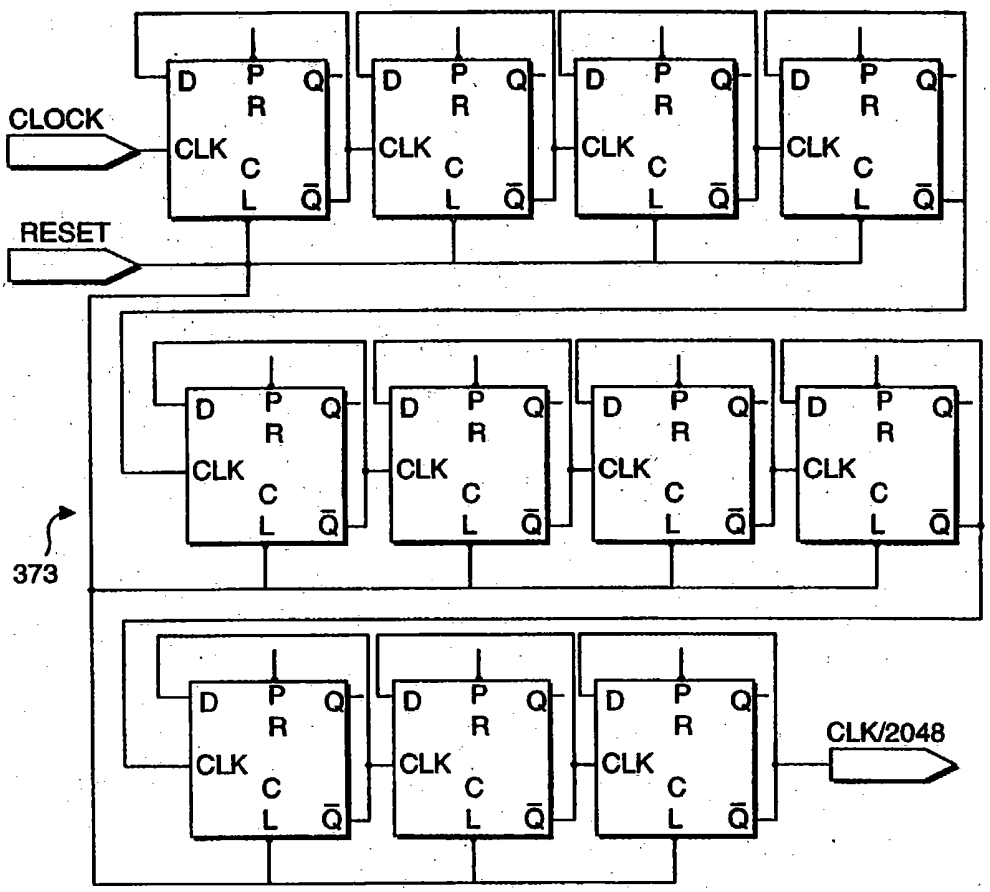


FIG. 15G

$$E_0 = \overline{(B1 + A_0)(C_3 / C_{1-1})}$$

$$E_1 = (C_3 / C_{1-2}) + B1$$

$$E_2 = (C_2 / C_1)(T_1)$$

FIG. 15H

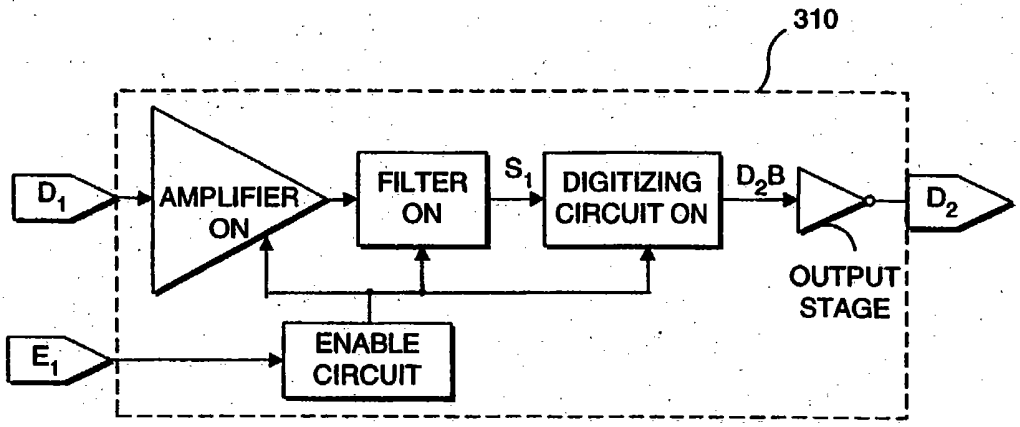


FIG. 15I

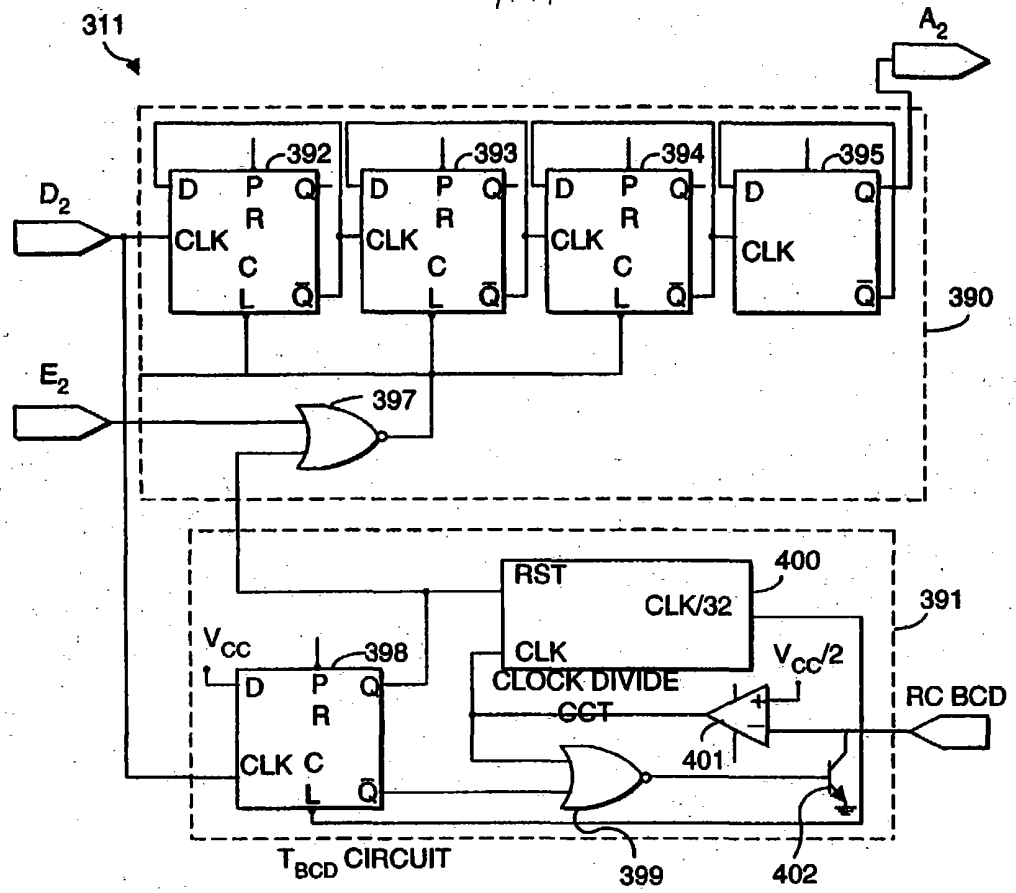


FIG. 15J

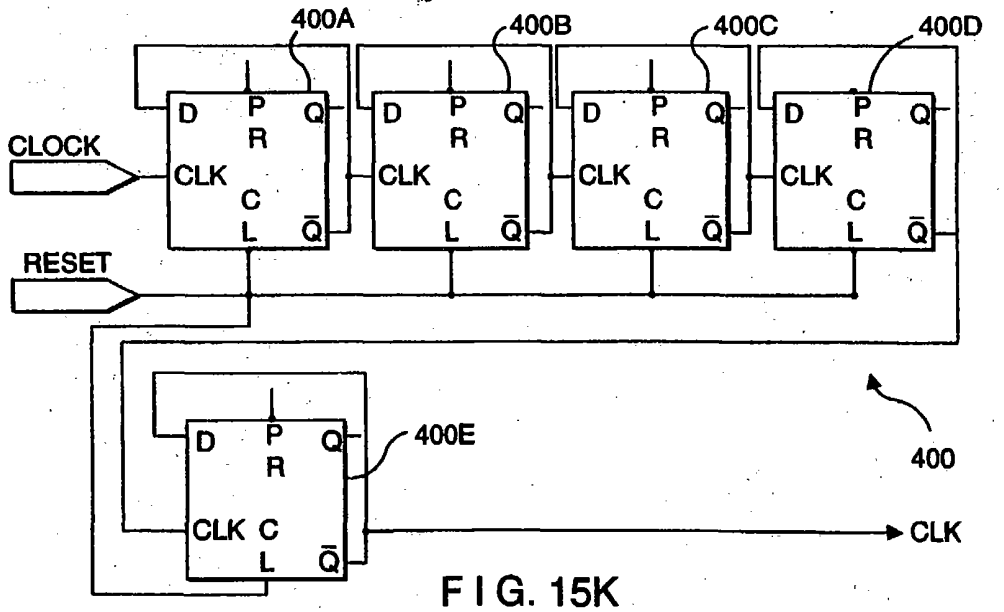


FIG. 15K

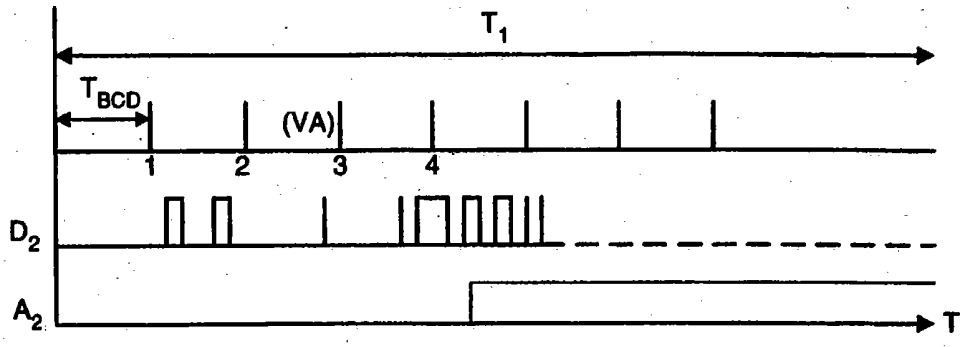


FIG. 15L

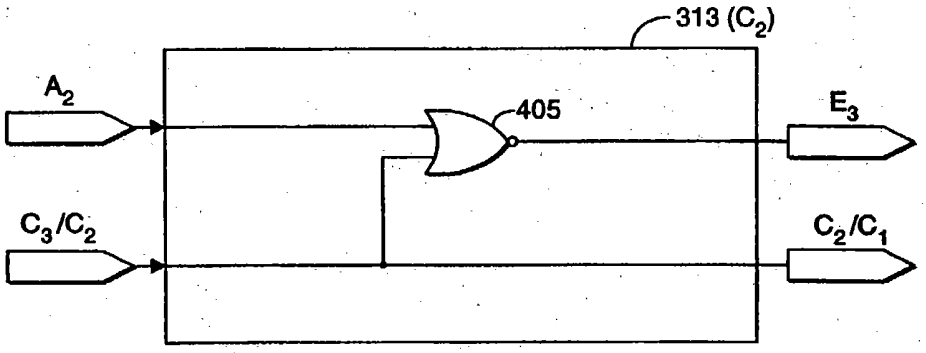


FIG. 15M

C_3 / C_2	A_2	E_3	C_2 / C_1
0	0	0	0
0	1	1	0
1	X	1	1

X: DON'T CARE (I.E. C_3 / C_2 OVERRIDES A_2)

FIG. 15N

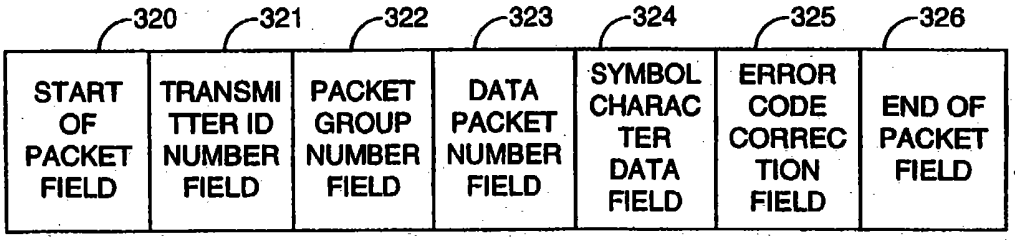


FIG. 15O

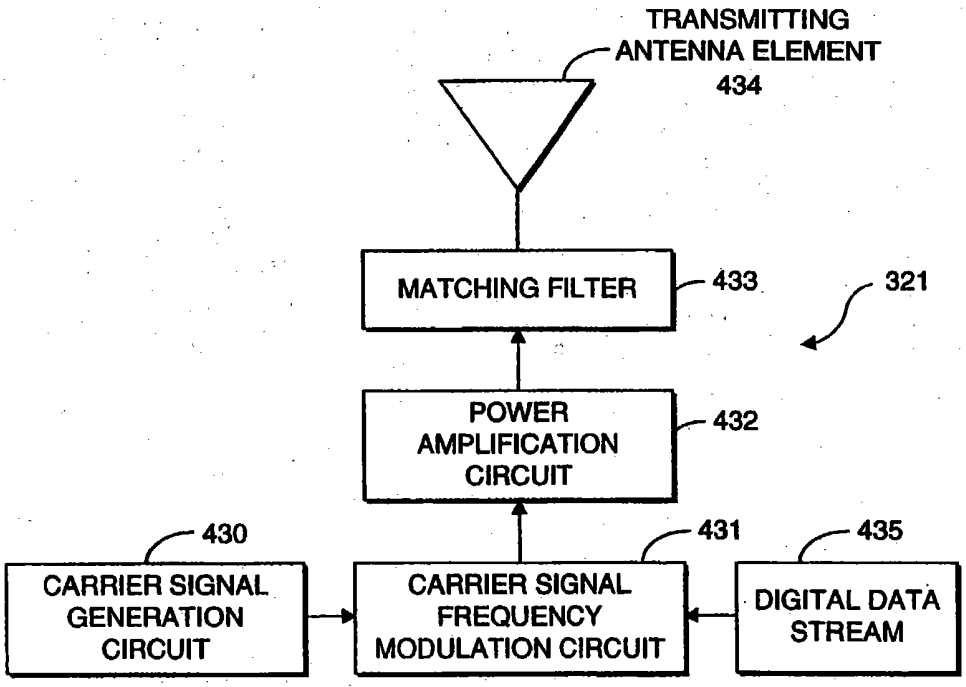


FIG. 16

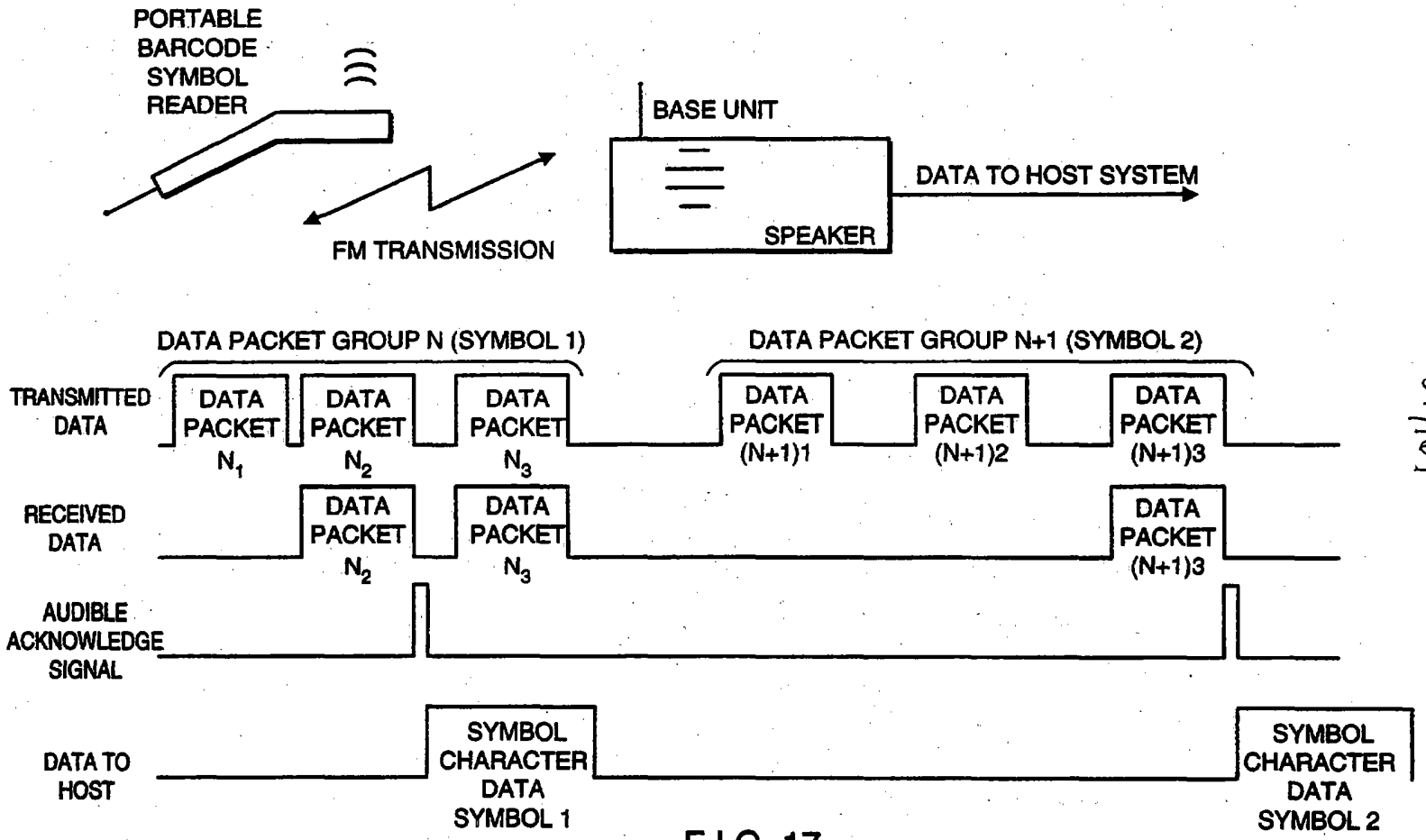

PORTABLE BARCODE SYMBOL READER
FM TRANSMISSION
BASE UNIT
SPEAKER
DATA TO HOST SYSTEM
DATA PACKET GROUP N (SYMBOL 1)
DATA PACKET GROUP N+1 (SYMBOL 2)
TRANSMITTED DATA
DATA PACKET N1
DATA PACKET N2
DATA PACKET N3
DATA PACKET (N+1)1
DATA PACKET (N+1)2
DATA PACKET (N+1)3
RECEIVED DATA
DATA PACKET N2
DATA PACKET N3
DATA PACKET (N+1)3
AUDIBLE ACKNOWLEDGE SIGNAL
DATA TO HOST
SYMBOL CHARACTER DATA SYMBOL 1
SYMBOL CHARACTER DATA SYMBOL 2

FIG. 17

54 / 106

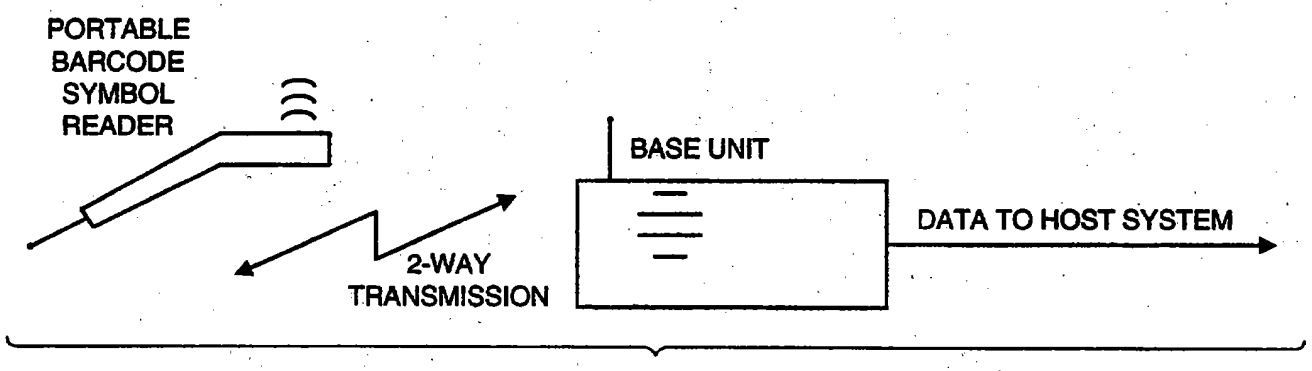

PORTABLE
BARCODE
SYMBOL
READER
BASE UNIT
DATA TO HOST SYSTEM
2-WAY
TRANSMISSION

FIG. 18

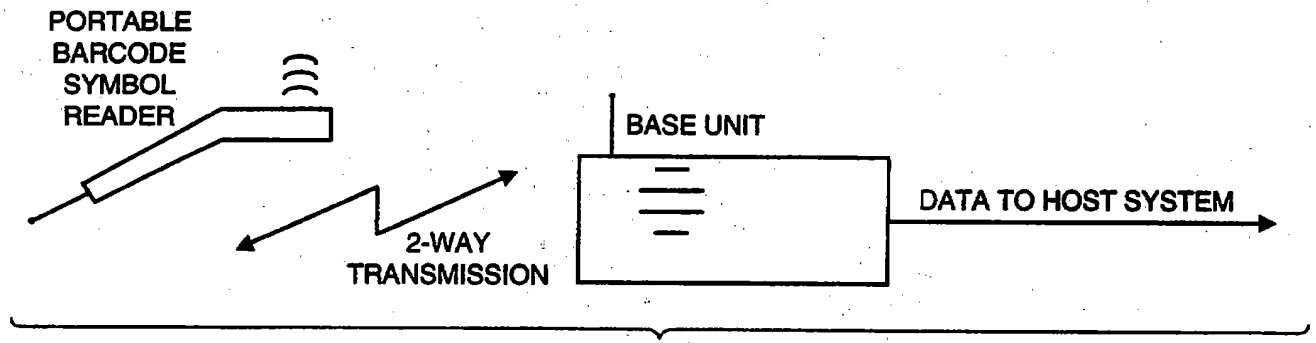

PORTABLE
BARCODE
SYMBOL
READER
BASE UNIT
DATA TO HOST SYSTEM
2-WAY
TRANSMISSION

FIG. 19

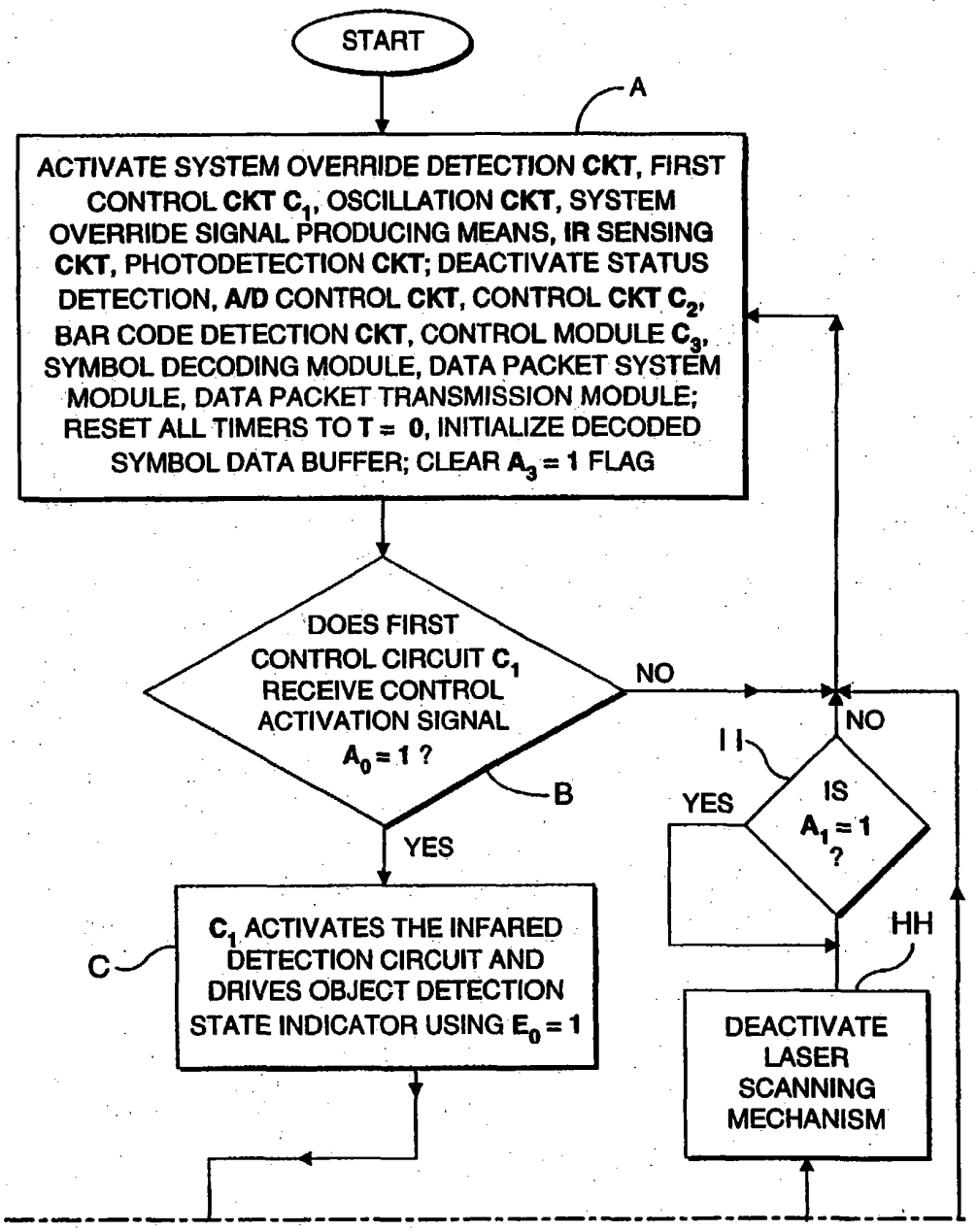

START
A
ACTIVATE SYSTEM OVERRIDE DETECTION CKT, FIRST CONTROL CKT C_1, OSCILLATION CKT, SYSTEM OVERRIDE SIGNAL PRODUCING MEANS, IR SENSING CKT, PHOTODETECTION CKT; DEACTIVATE STATUS DETECTION, A/D CONTROL CKT, CONTROL CKT C_2, BAR CODE DETECTION CKT, CONTROL MODULE C_3, SYMBOL DECODING MODULE, DATA PACKET SYSTEM MODULE, DATA PACKET TRANSMISSION MODULE; RESET ALL TIMERS TO T = 0, INITIALIZE DECODED SYMBOL DATA BUFFER; CLEAR $A_3 = 1$ FLAG
DOES FIRST CONTROL CIRCUIT C_1 RECEIVE CONTROL ACTIVATION SIGNAL $A_0 = 1$?
NO
B
YES
C
C_1 ACTIVATES THE INFARED DETECTION CIRCUIT AND DRIVES OBJECT DETECTION STATE INDICATOR USING $E_0 = 1$
II
IS $A_1 = 1$?
NO
YES
HH
DEACTIVATE LASER SCANNING MECHANISM

FIG. 20A1

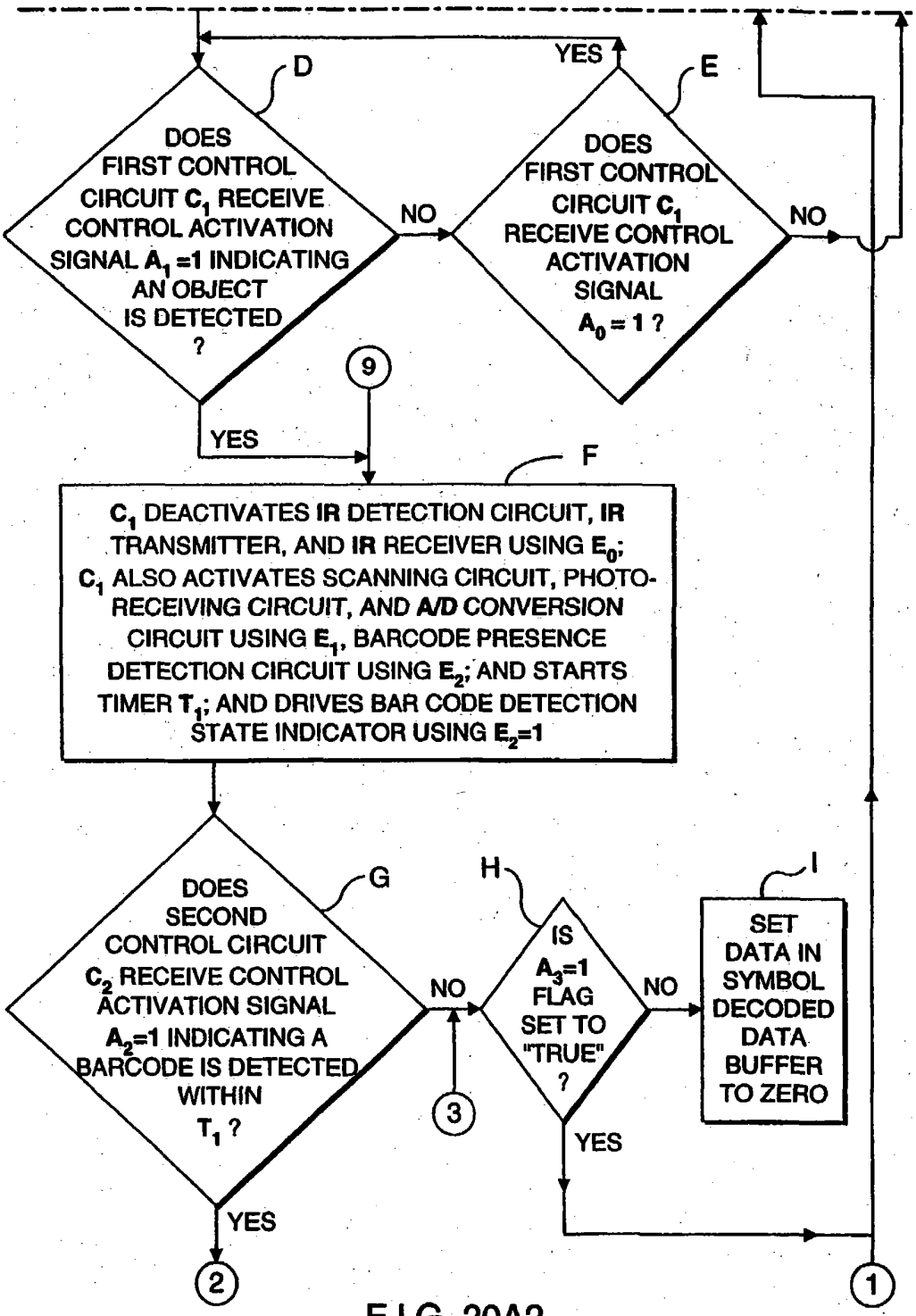

D
DOES FIRST CONTROL CIRCUIT C_1 RECEIVE CONTROL ACTIVATION SIGNAL A_1=1 INDICATING AN OBJECT IS DETECTED ?
NO
YES
E
DOES FIRST CONTROL CIRCUIT C_1 RECEIVE CONTROL ACTIVATION SIGNAL A_0 = 1 ?
NO
YES
9
F
C_1 DEACTIVATES IR DETECTION CIRCUIT, IR TRANSMITTER, AND IR RECEIVER USING E_0; C_1 ALSO ACTIVATES SCANNING CIRCUIT, PHOTO-RECEIVING CIRCUIT, AND A/D CONVERSION CIRCUIT USING E_1, BARCODE PRESENCE DETECTION CIRCUIT USING E_2; AND STARTS TIMER T_1; AND DRIVES BAR CODE DETECTION STATE INDICATOR USING E_2=1
G
DOES SECOND CONTROL CIRCUIT C_2 RECEIVE CONTROL ACTIVATION SIGNAL A_2=1 INDICATING A BARCODE IS DETECTED WITHIN T_1 ?
NO
YES
H
IS A_3=1 FLAG SET TO "TRUE" ?
NO
YES
I
SET DATA IN SYMBOL DECODED DATA BUFFER TO ZERO
3
2
1

FIG. 20A2

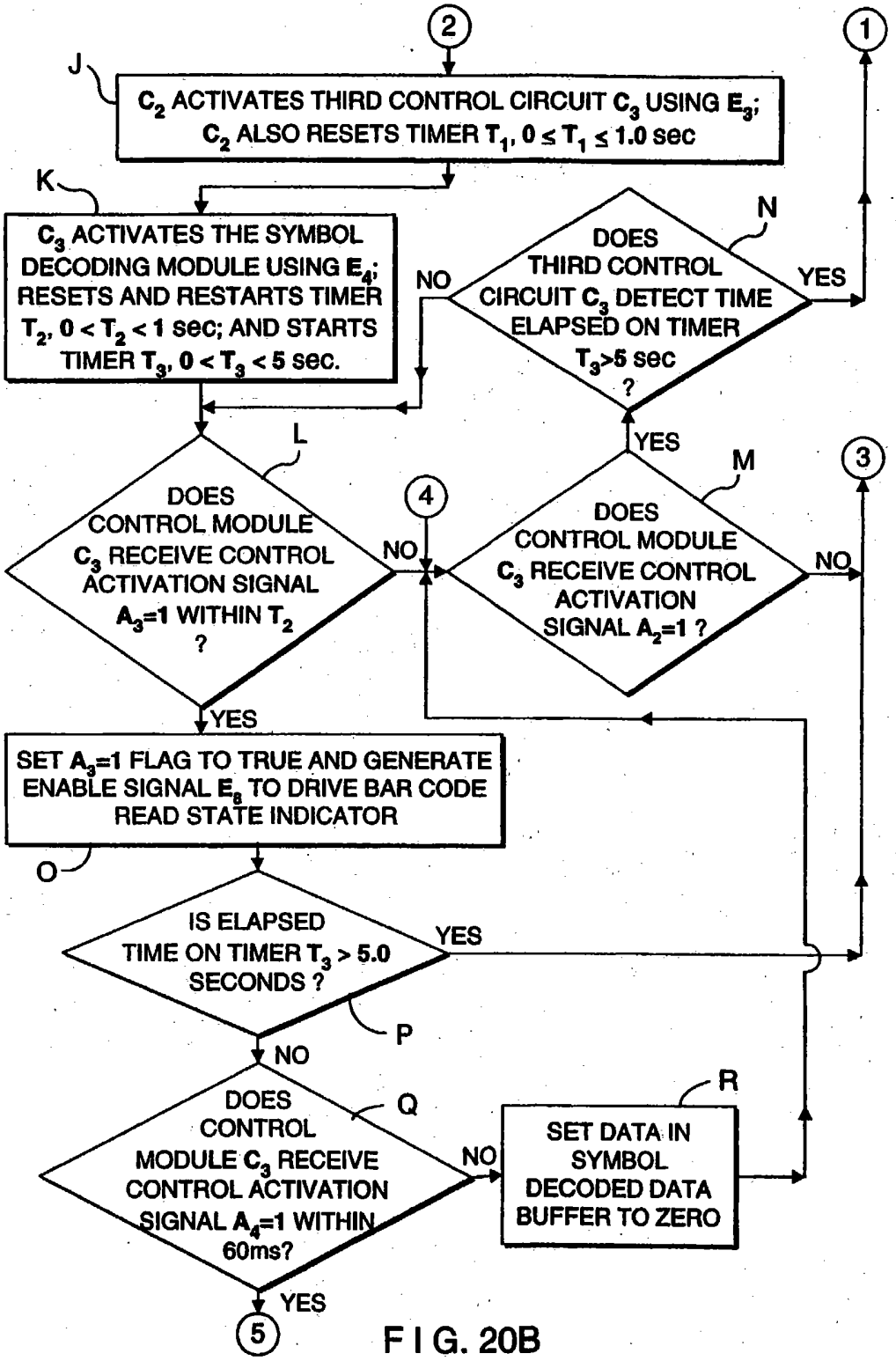

2
1
J
C_2 ACTIVATES THIRD CONTROL CIRCUIT C_3 USING E_3; C_2 ALSO RESETS TIMER T_1, $0 \leq T_1 \leq 1.0$ sec
K
C_3 ACTIVATES THE SYMBOL DECODING MODULE USING E_4; RESETS AND RESTARTS TIMER T_2, $0 < T_2 < 1$ sec; AND STARTS TIMER T_3, $0 < T_3 < 5$ sec.
N
DOES THIRD CONTROL CIRCUIT C_3 DETECT TIME ELAPSED ON TIMER T_3>5 sec ?
NO
YES
YES
L
DOES CONTROL MODULE C_3 RECEIVE CONTROL ACTIVATION SIGNAL A_3=1 WITHIN T_2 ?
4
NO
M
DOES CONTROL MODULE C_3 RECEIVE CONTROL ACTIVATION SIGNAL A_2=1 ?
3
NO
YES
SET A_3=1 FLAG TO TRUE AND GENERATE ENABLE SIGNAL E_8 TO DRIVE BAR CODE READ STATE INDICATOR
O
IS ELAPSED TIME ON TIMER T_3 > 5.0 SECONDS ?
YES
P
NO
DOES CONTROL MODULE C_3 RECEIVE CONTROL ACTIVATION SIGNAL A_4=1 WITHIN 60ms?
Q
NO
R
SET DATA IN SYMBOL DECODED DATA BUFFER TO ZERO
YES
5

FIG. 20B

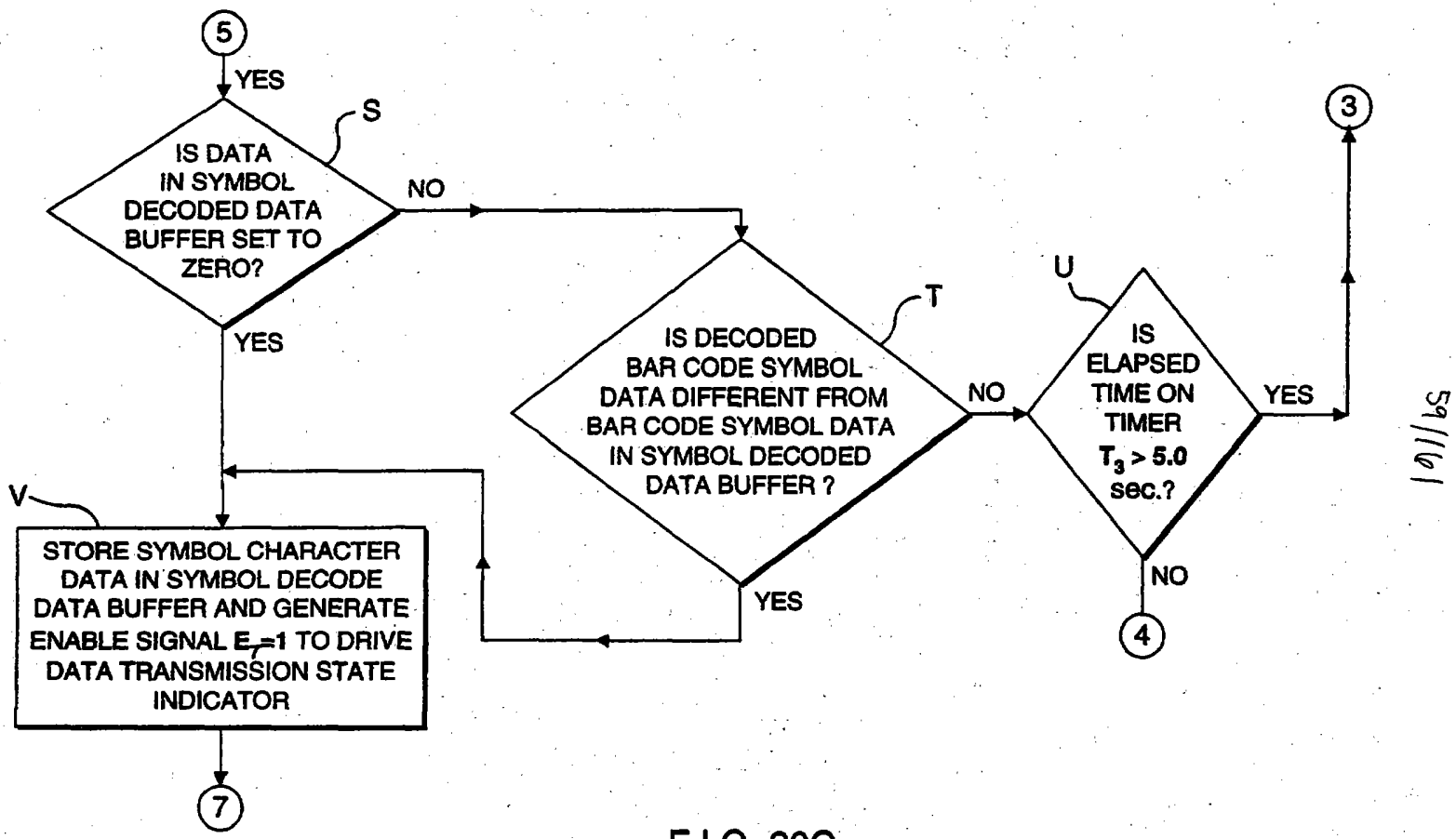

5
YES
S
IS DATA IN SYMBOL DECODED DATA BUFFER SET TO ZERO?
NO
YES
T
IS DECODED BAR CODE SYMBOL DATA DIFFERENT FROM BAR CODE SYMBOL DATA IN SYMBOL DECODED DATA BUFFER ?
NO
YES
U
IS ELAPSED TIME ON TIMER $T_3 > 5.0$ sec.?
YES
NO
3
4
V
STORE SYMBOL CHARACTER DATA IN SYMBOL DECODE DATA BUFFER AND GENERATE ENABLE SIGNAL E_7=1 TO DRIVE DATA TRANSMISSION STATE INDICATOR
7

FIG. 20C

60/176

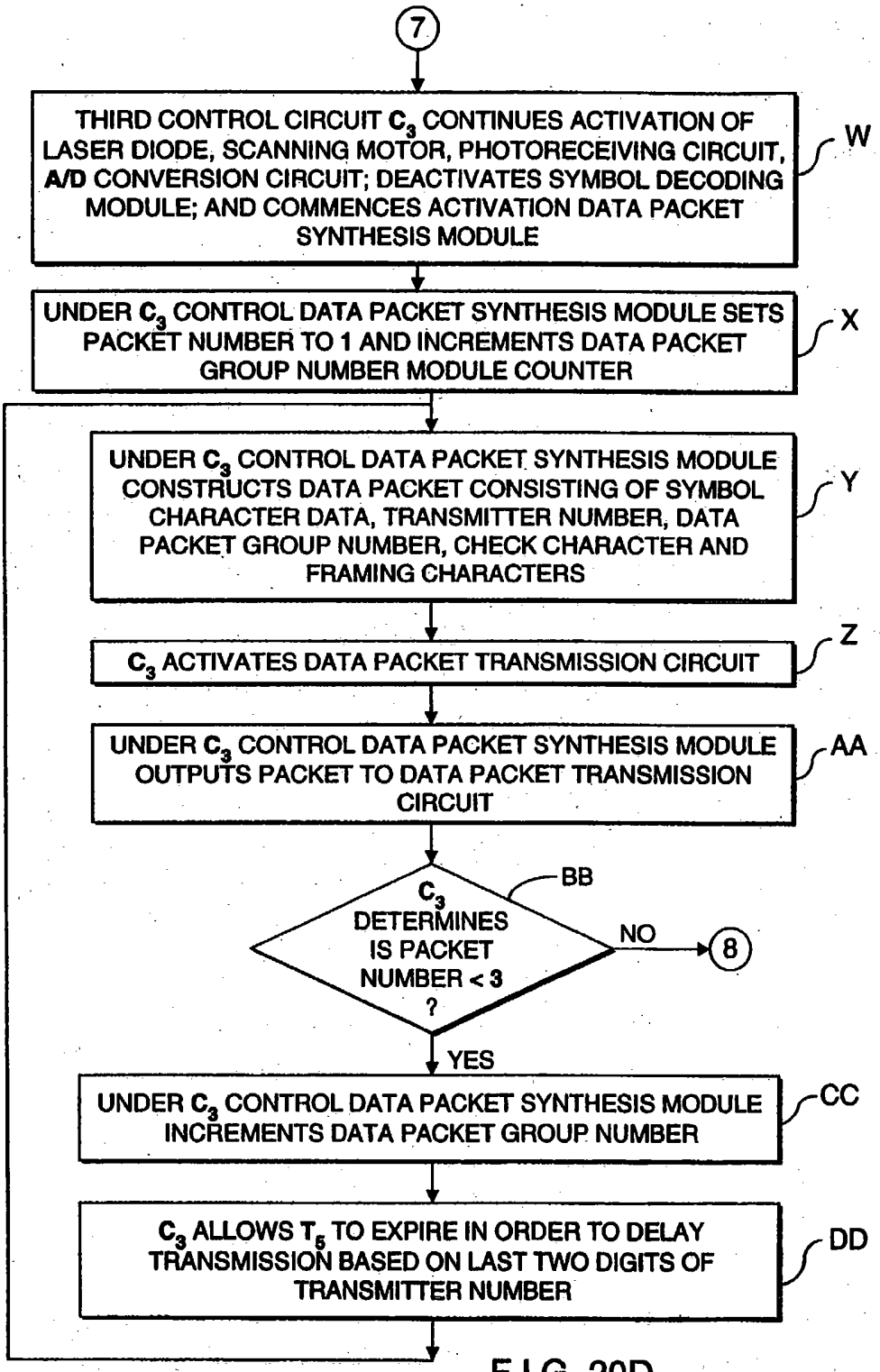


FIG. 20D

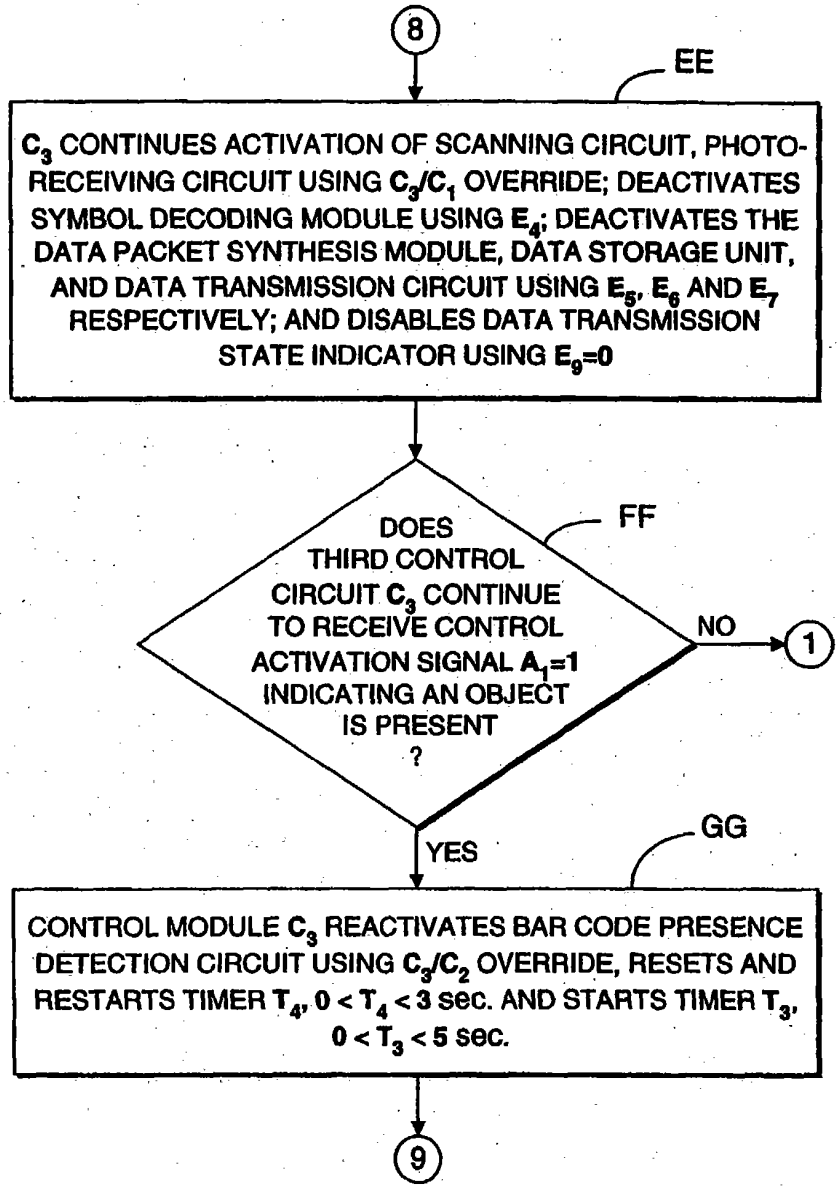

8
EE
C3 CONTINUES ACTIVATION OF SCANNING CIRCUIT, PHOTO-RECEIVING CIRCUIT USING C3/C1 OVERRIDE; DEACTIVATES SYMBOL DECODING MODULE USING E4; DEACTIVATES THE DATA PACKET SYNTHESIS MODULE, DATA STORAGE UNIT, AND DATA TRANSMISSION CIRCUIT USING E5, E6 AND E7 RESPECTIVELY; AND DISABLES DATA TRANSMISSION STATE INDICATOR USING E9=0
FF
DOES THIRD CONTROL CIRCUIT C3 CONTINUE TO RECEIVE CONTROL ACTIVATION SIGNAL A1=1 INDICATING AN OBJECT IS PRESENT ?
NO
1
YES
GG
CONTROL MODULE C3 REACTIVATES BAR CODE PRESENCE DETECTION CIRCUIT USING C3/C2 OVERRIDE, RESETS AND RESTARTS TIMER T4, 0 < T4 < 3 sec. AND STARTS TIMER T3, 0 < T3 < 5 sec.
9

FIG. 20E

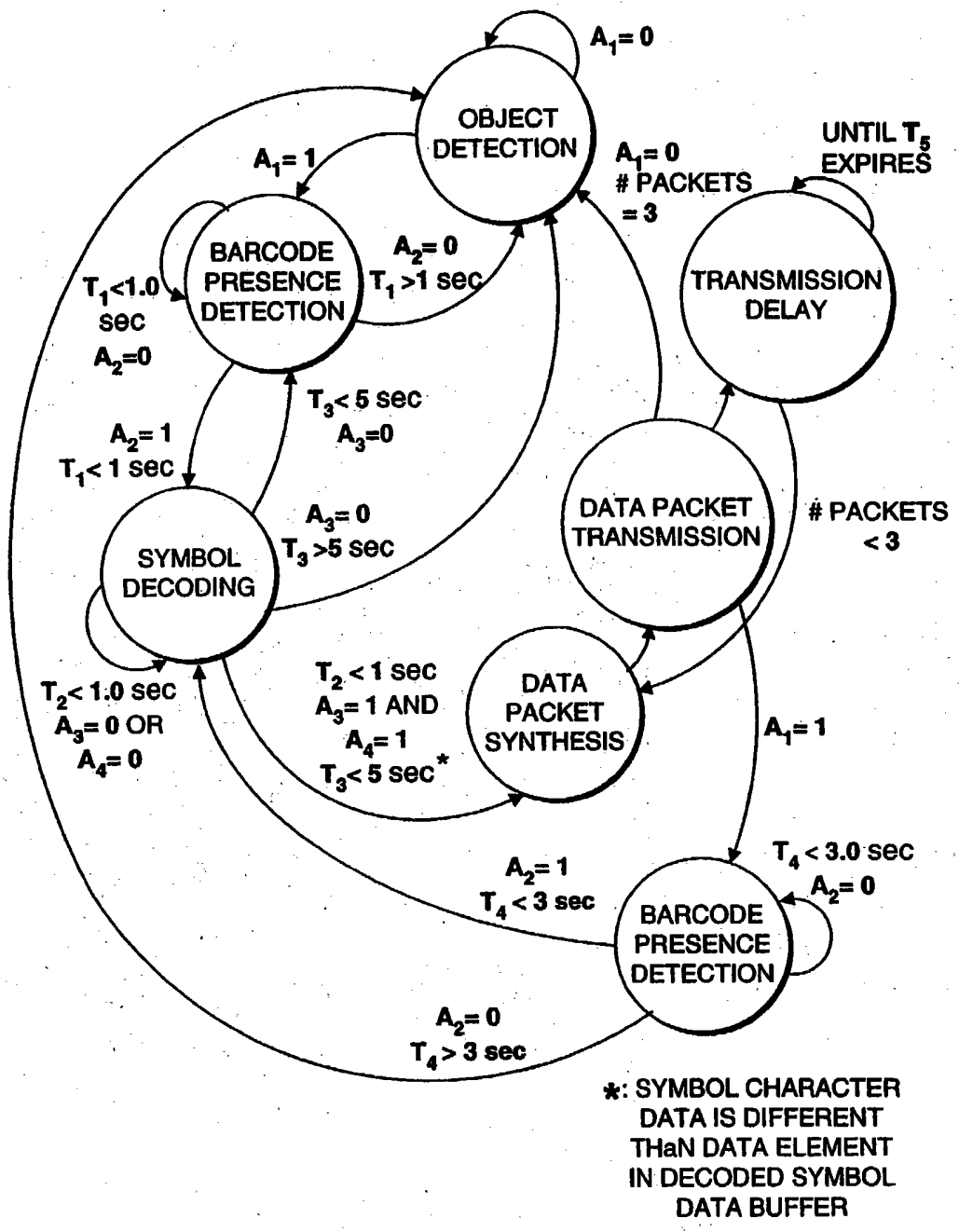

OBJECT DETECTION
BARCODE PRESENCE DETECTION
SYMBOL DECODING
DATA PACKET SYNTHESIS
DATA PACKET TRANSMISSION
TRANSMISSION DELAY
BARCODE PRESENCE DETECTION
A1= 0
A1= 1
A1= 0 # PACKETS = 3
UNTIL T5 EXPIRES
T1<1.0 sec A2=0
A2= 0 T1 >1 sec
T3< 5 sec A3=0
A2= 1 T1< 1 sec
A3= 0 T3 >5 sec
# PACKETS < 3
T2< 1.0 sec A3= 0 OR A4= 0
T2 < 1 sec A3= 1 AND A4= 1 T3< 5 sec*
A1= 1
T4 < 3.0 sec A2= 0
A2= 1 T4 < 3 sec
A2= 0 T4 > 3 sec
*: SYMBOL CHARACTER DATA IS DIFFERENT THaN DATA ELEMENT IN DECODED SYMBOL DATA BUFFER

FIG. 21

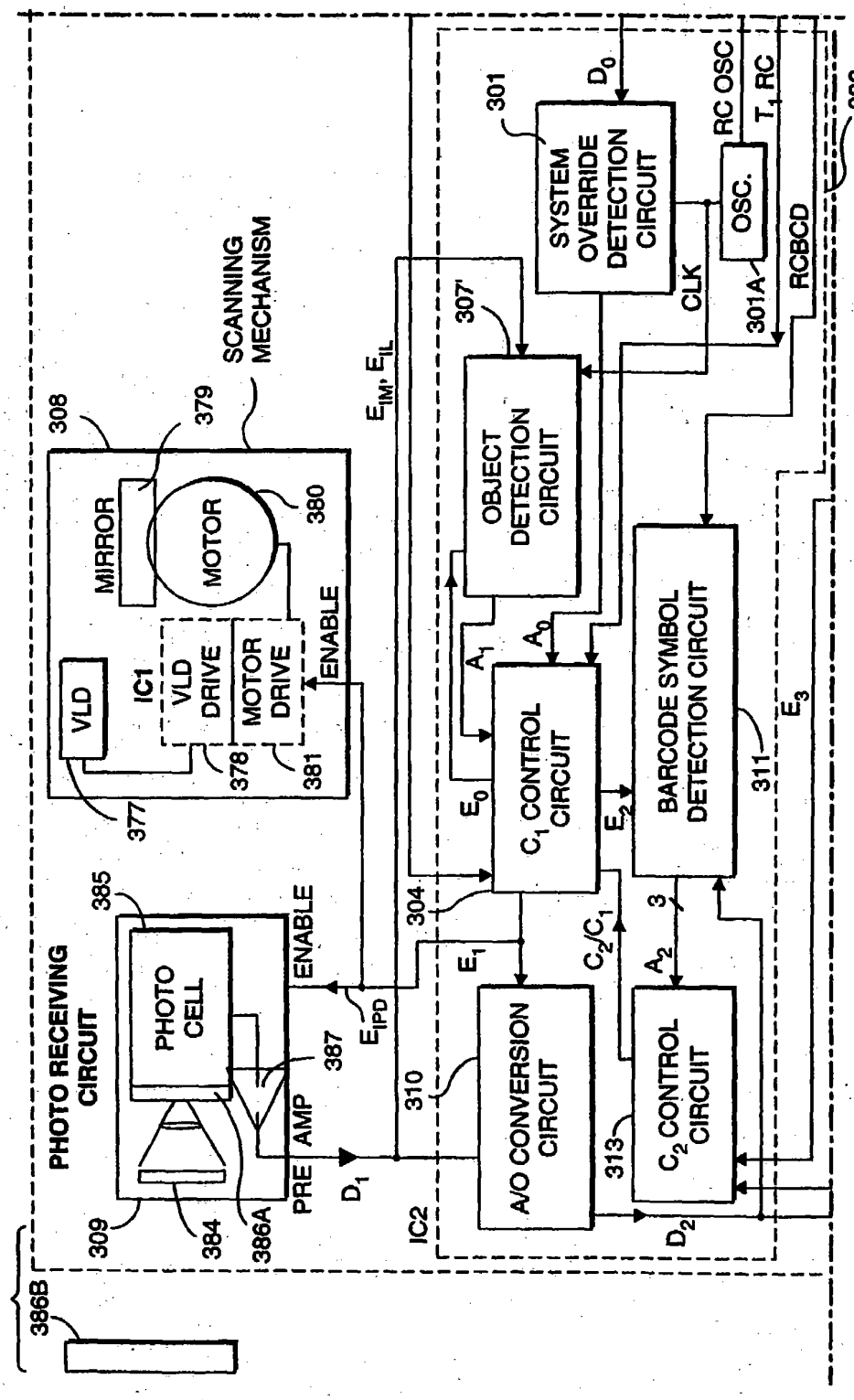


PHOTO RECEIVING CIRCUIT
PHOTO CELL
PRE AMP
ENABLE
SCANNING MECHANISM
MIRROR
MOTOR
VLD
IC1
VLD DRIVE
MOTOR DRIVE
ENABLE
OBJECT DETECTION CIRCUIT
SYSTEM OVERRIDE DETECTION CIRCUIT
OSC.
RC OSC
T_1 RC
RCBCD
CLK
C_1 CONTROL CIRCUIT
BARCODE SYMBOL DETECTION CIRCUIT
A/O CONVERSION CIRCUIT
C_2 CONTROL CIRCUIT
IC2
E_{IM}, E_{IL}
E_{IPD}
D_0
D_1
D_2
A_0
A_1
A_2
E_0
E_1
E_2
E_3
C_2/C_1
3
309
384
386A
386B
377
378
379
380
381
385
387
301
301A
304
307'
308
310
311
313
333

FIG. 22A1

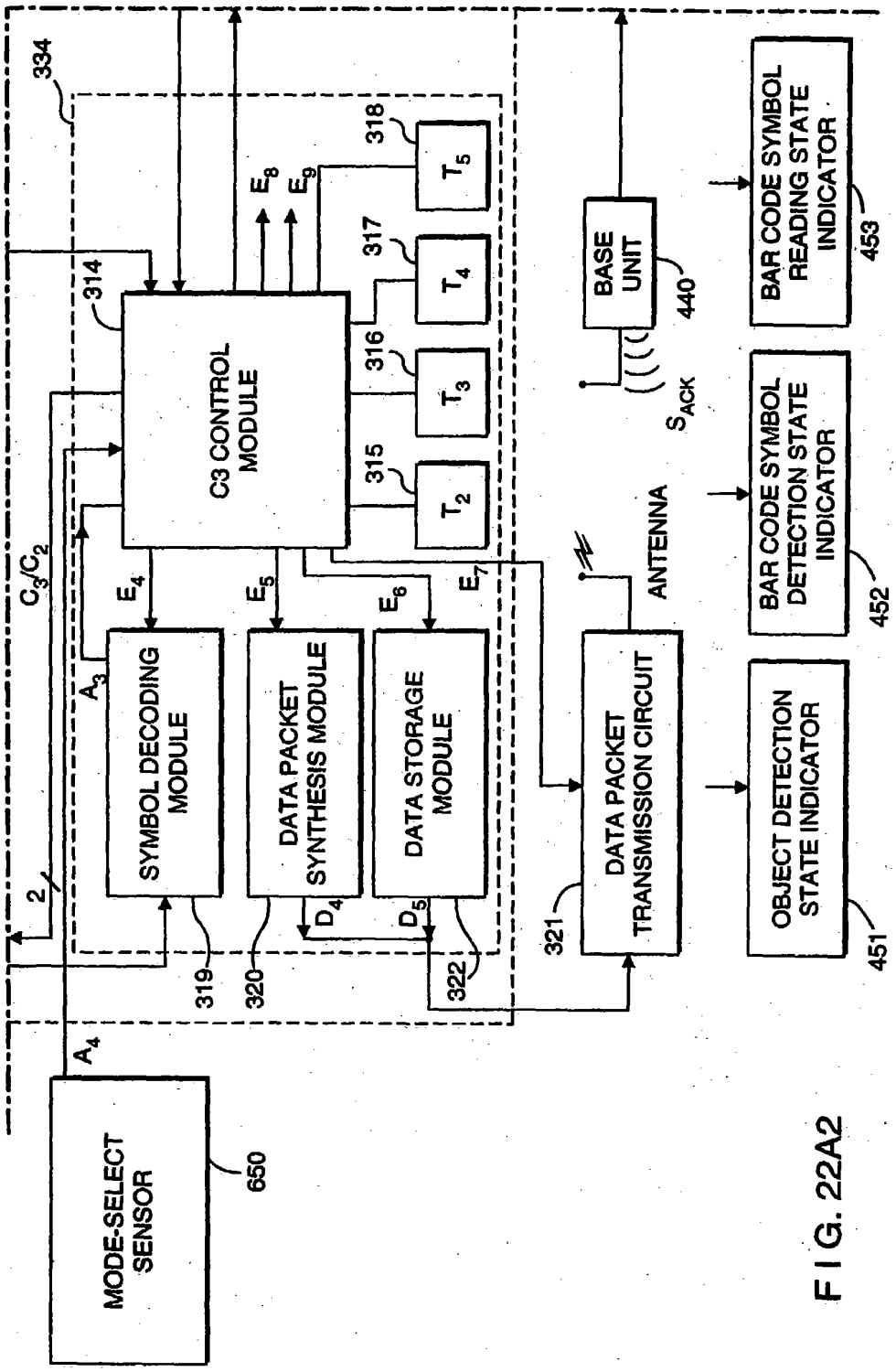

334
314
C3 CONTROL MODULE
T_5
T_4
T_3
T_2
318
317
316
315
E_8
E_9
E_4
E_5
E_6
E_7
C_3/C_2
A_3
A_4
2
SYMBOL DECODING MODULE
DATA PACKET SYNTHESIS MODULE
DATA STORAGE MODULE
D_4
D_5
319
320
322
321
DATA PACKET TRANSMISSION CIRCUIT
ANTENNA
S_{ACK}
BASE UNIT
440
MODE-SELECT SENSOR
650
OBJECT DETECTION STATE INDICATOR
451
BAR CODE SYMBOL DETECTION STATE INDICATOR
452
BAR CODE SYMBOL READING STATE INDICATOR
453

FIG. 22A2

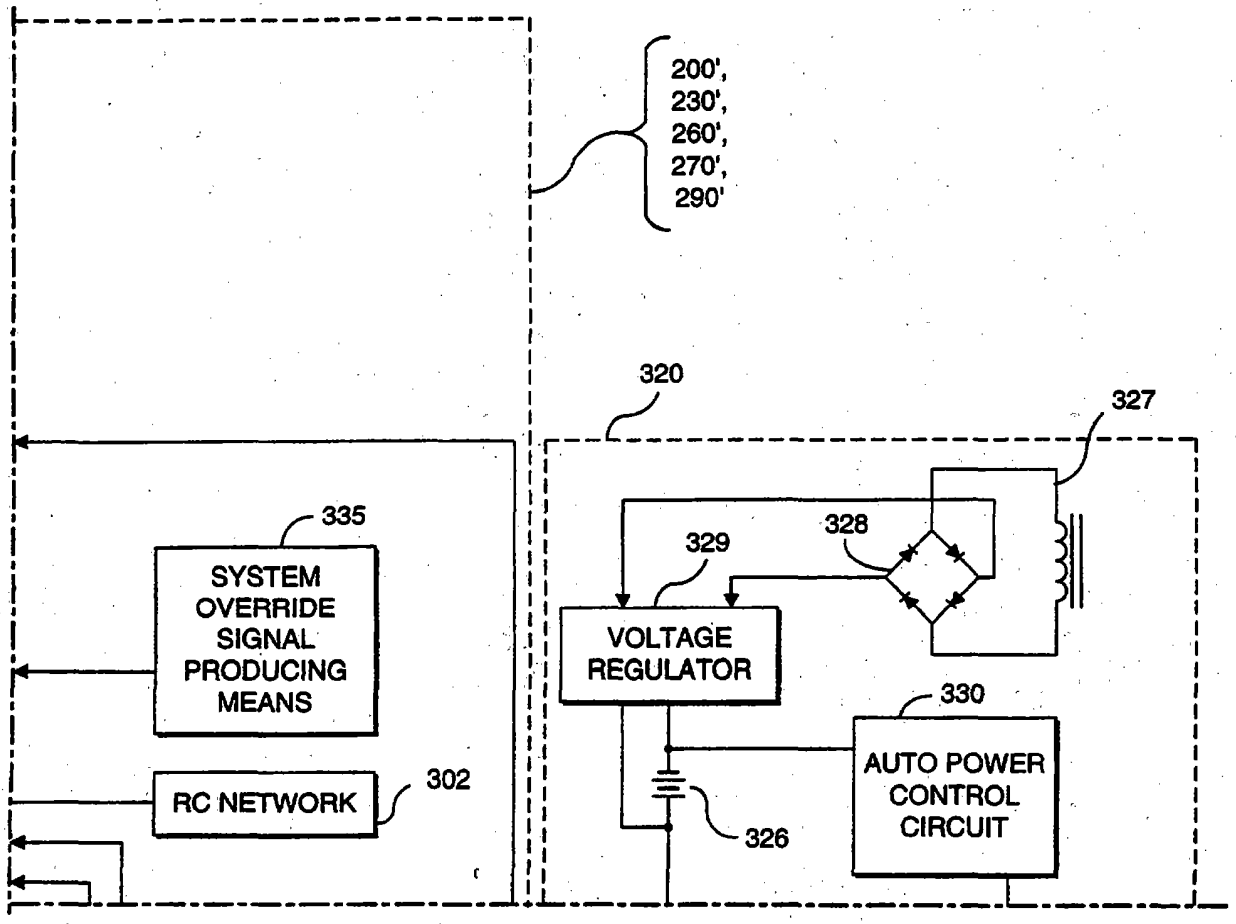

200',
230',
260',
270',
290'
320
327
335
SYSTEM OVERRIDE SIGNAL PRODUCING MEANS
329
328
VOLTAGE REGULATOR
330
AUTO POWER CONTROL CIRCUIT
RC NETWORK
302
326

FIG. 22A3

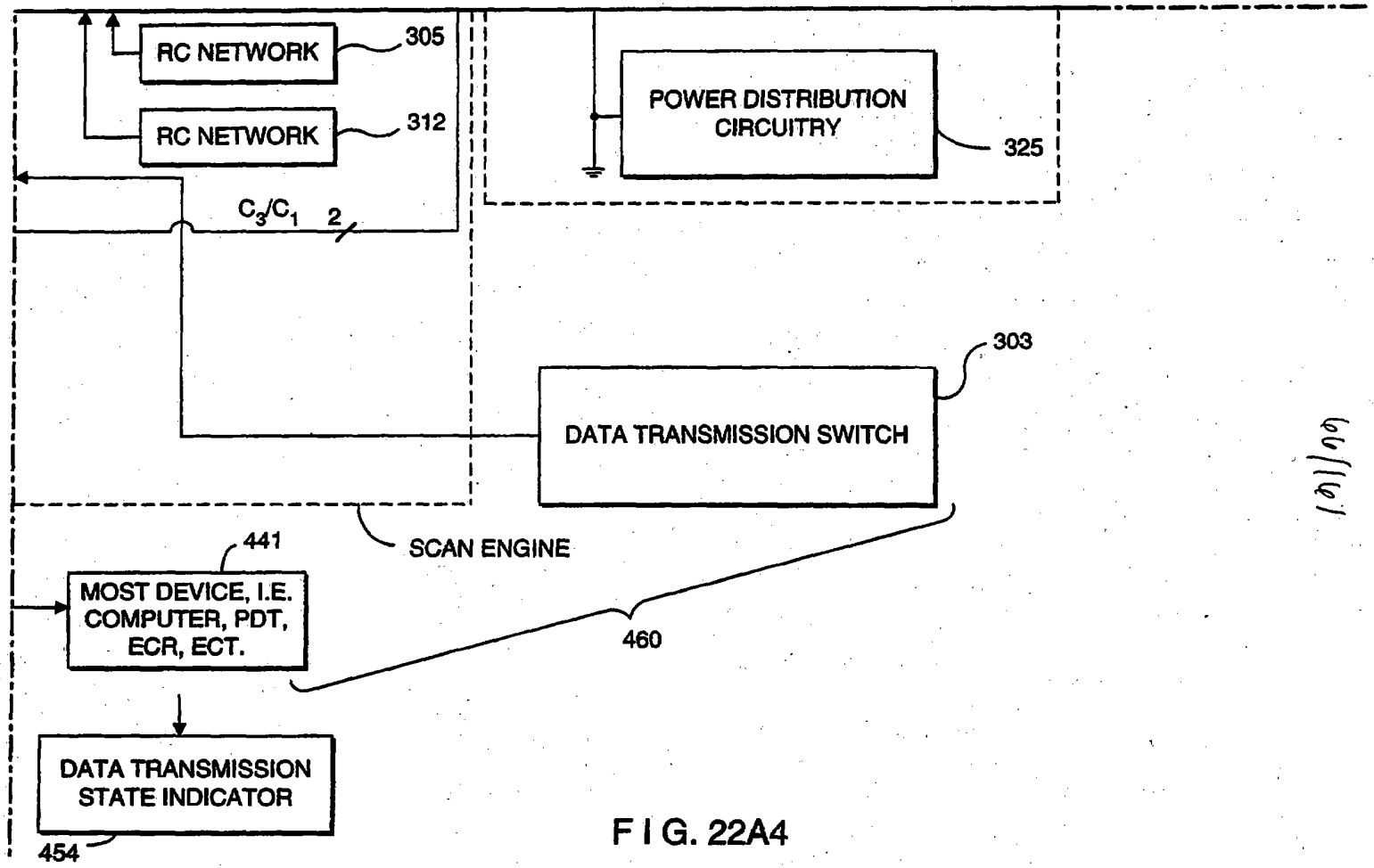

RC NETWORK
305
RC NETWORK
312
C_3/C_1 2
POWER DISTRIBUTION CIRCUITRY
325
303
DATA TRANSMISSION SWITCH
SCAN ENGINE
441
MOST DEVICE, I.E. COMPUTER, PDT, ECR, ECT.
460
DATA TRANSMISSION STATE INDICATOR
454

FIG. 22A4

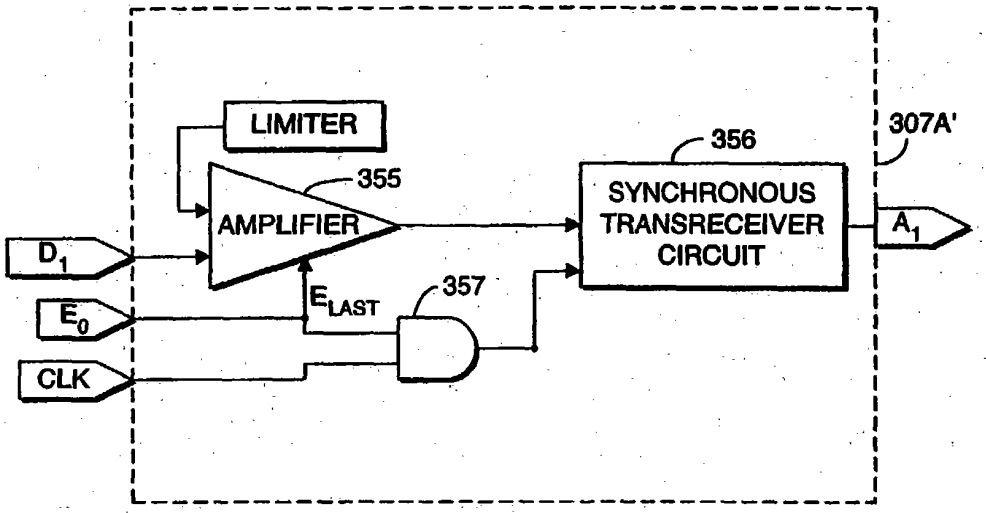

LIMITER
355
AMPLIFIER
356
SYNCHRONOUS
TRANSRECEIVER
CIRCUIT
307A'
D_1
E_0
CLK
E_{LAST}
357
A_1

FIG. 22B

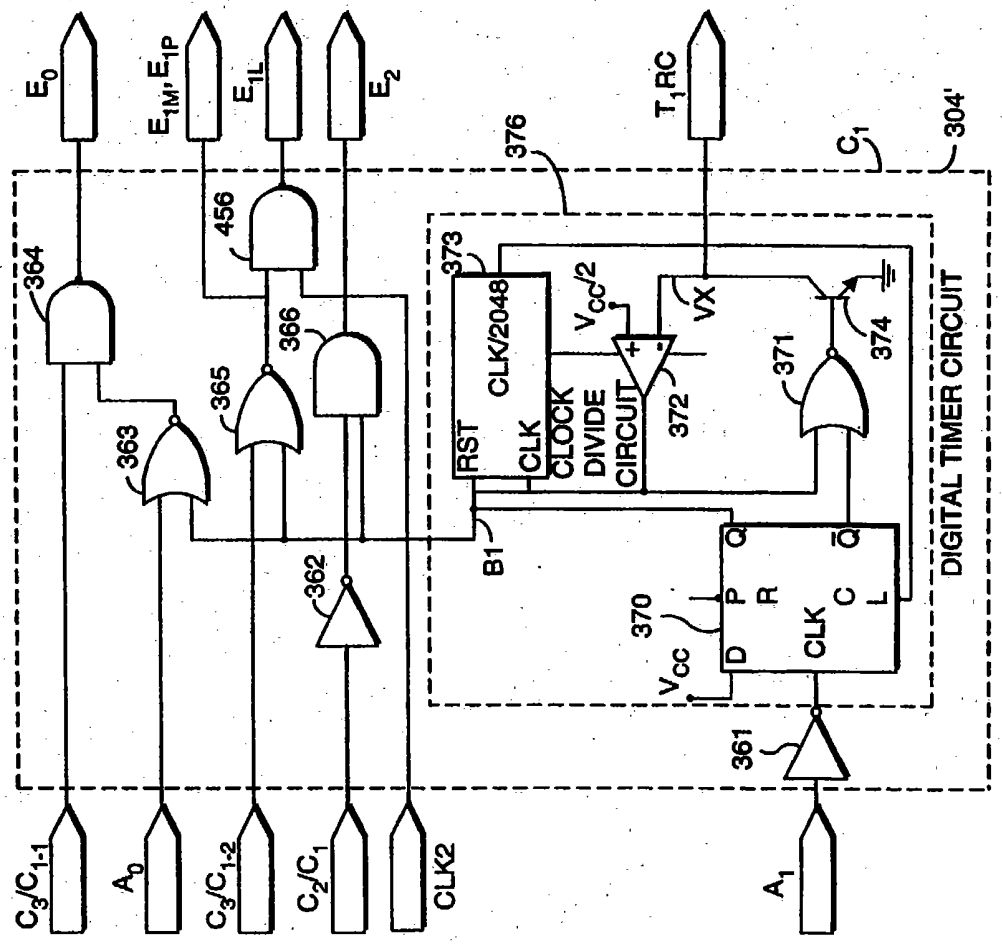

E0
E1M, E1P
E1L
E2
T1RC
C1
304'
376
364
456
366
365
363
373
CLK/2048
RST
CLK
CLOCK DIVIDE CIRCUIT
VCC/2
VX
372
371
374
B1
362
370
VCC
D
P
R
CLK
C
L
Q
Q̄
DIGITAL TIMER CIRCUIT
361
C3/C1-1
A0
C3/C1-2
C2/C1
CLK2
A1

FIG. 22C

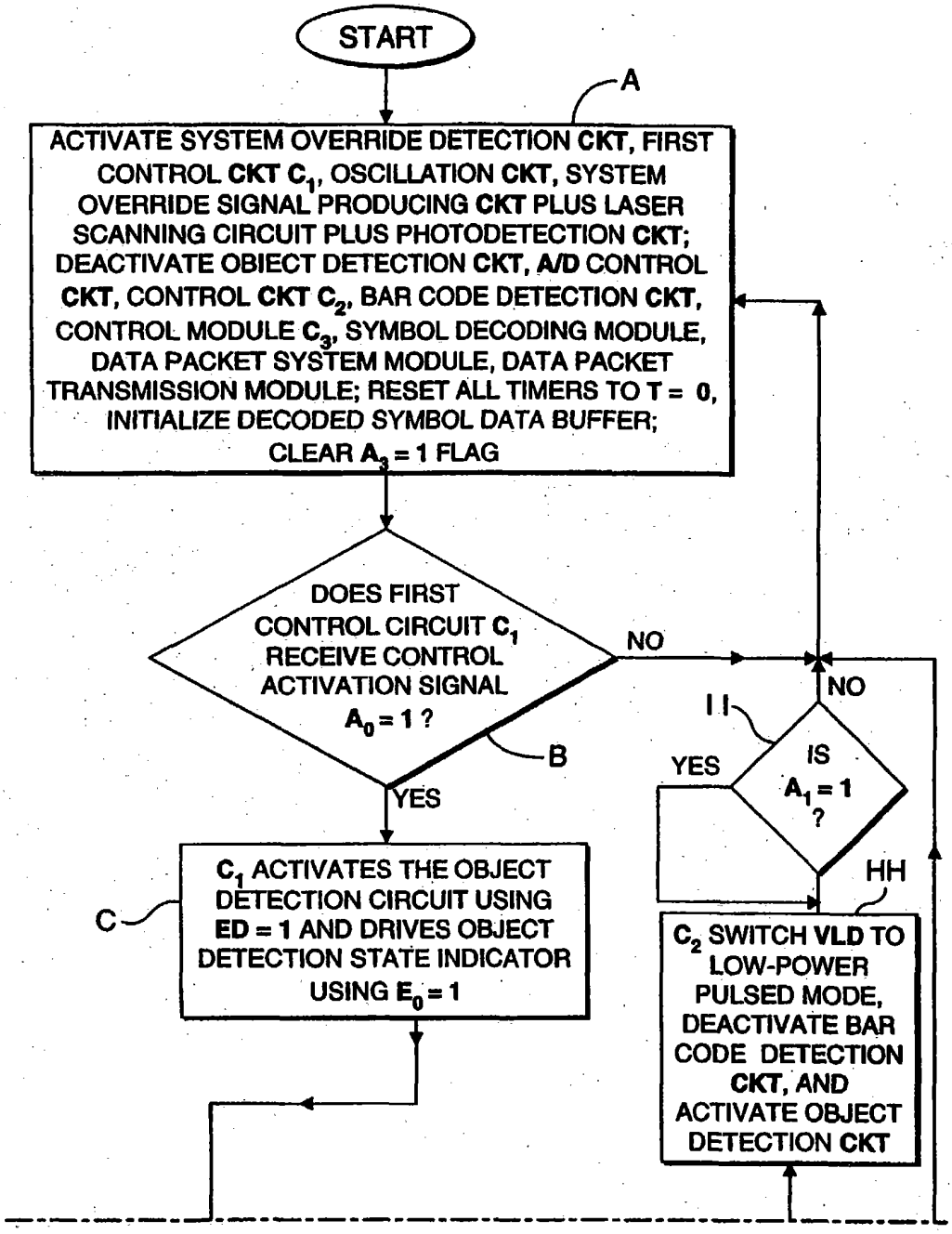

START
A
ACTIVATE SYSTEM OVERRIDE DETECTION CKT, FIRST CONTROL CKT C_1, OSCILLATION CKT, SYSTEM OVERRIDE SIGNAL PRODUCING CKT PLUS LASER SCANNING CIRCUIT PLUS PHOTODETECTION CKT; DEACTIVATE OBIECT DETECTION CKT, A/D CONTROL CKT, CONTROL CKT C_2, BAR CODE DETECTION CKT, CONTROL MODULE C_3, SYMBOL DECODING MODULE, DATA PACKET SYSTEM MODULE, DATA PACKET TRANSMISSION MODULE; RESET ALL TIMERS TO T = 0, INITIALIZE DECODED SYMBOL DATA BUFFER; CLEAR $A_3 = 1$ FLAG
DOES FIRST CONTROL CIRCUIT C_1 RECEIVE CONTROL ACTIVATION SIGNAL $A_0 = 1$?
NO
B
YES
C
C_1 ACTIVATES THE OBJECT DETECTION CIRCUIT USING ED = 1 AND DRIVES OBJECT DETECTION STATE INDICATOR USING $E_0 = 1$
II
NO
IS $A_1 = 1$?
YES
HH
C_2 SWITCH VLD TO LOW-POWER PULSED MODE, DEACTIVATE BAR CODE DETECTION CKT, AND ACTIVATE OBJECT DETECTION CKT

FIG. 23A1

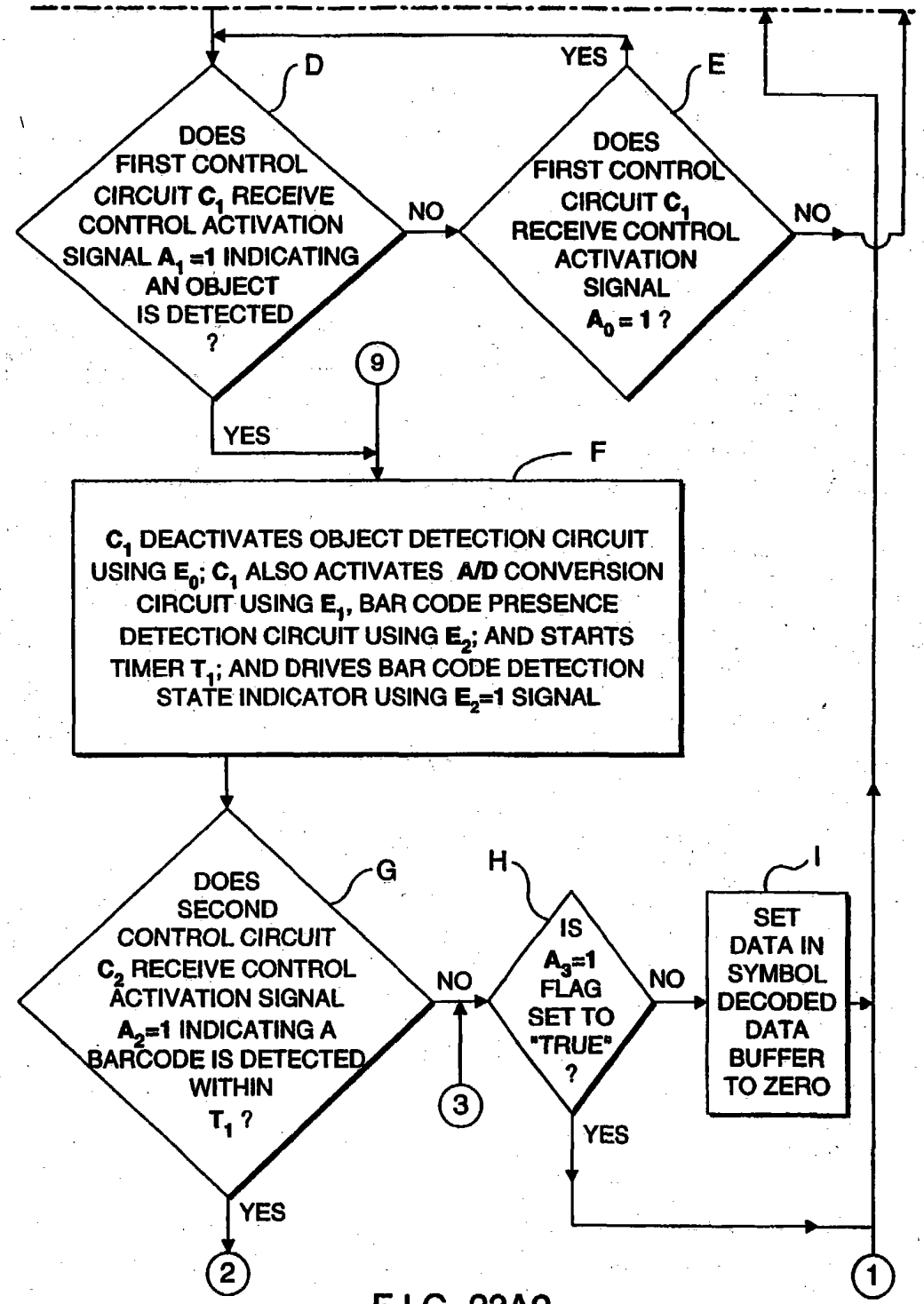

D
DOES FIRST CONTROL CIRCUIT C_1 RECEIVE CONTROL ACTIVATION SIGNAL A_1 =1 INDICATING AN OBJECT IS DETECTED ?
NO
YES
E
DOES FIRST CONTROL CIRCUIT C_1 RECEIVE CONTROL ACTIVATION SIGNAL A_0 = 1 ?
NO
YES
9
F
C_1 DEACTIVATES OBJECT DETECTION CIRCUIT USING E_0; C_1 ALSO ACTIVATES A/D CONVERSION CIRCUIT USING E_1, BAR CODE PRESENCE DETECTION CIRCUIT USING E_2; AND STARTS TIMER T_1; AND DRIVES BAR CODE DETECTION STATE INDICATOR USING E_2=1 SIGNAL
G
DOES SECOND CONTROL CIRCUIT C_2 RECEIVE CONTROL ACTIVATION SIGNAL A_2=1 INDICATING A BARCODE IS DETECTED WITHIN T_1 ?
NO
YES
H
IS A_3=1 FLAG SET TO "TRUE" ?
NO
YES
I
SET DATA IN SYMBOL DECODED DATA BUFFER TO ZERO
3
2
1

FIG. 23A2

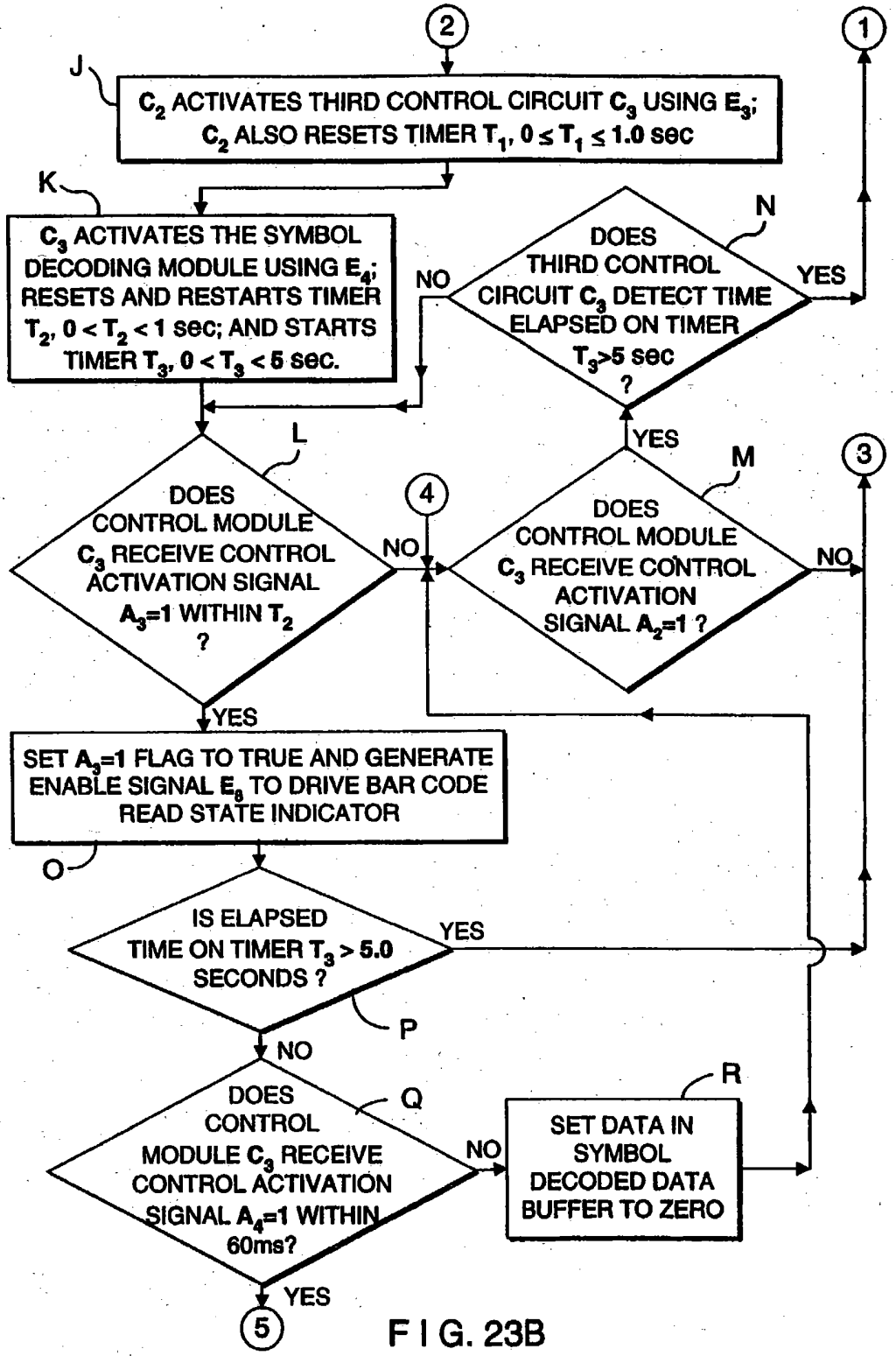

2
1
J
C_2 ACTIVATES THIRD CONTROL CIRCUIT C_3 USING E_3; C_2 ALSO RESETS TIMER T_1, $0 \leq T_1 \leq 1.0$ sec
K
C_3 ACTIVATES THE SYMBOL DECODING MODULE USING E_4; RESETS AND RESTARTS TIMER T_2, $0 < T_2 < 1$ sec; AND STARTS TIMER T_3, $0 < T_3 < 5$ sec.
N
DOES THIRD CONTROL CIRCUIT C_3 DETECT TIME ELAPSED ON TIMER T_3>5 sec ?
NO
YES
L
DOES CONTROL MODULE C_3 RECEIVE CONTROL ACTIVATION SIGNAL A_3=1 WITHIN T_2 ?
4
NO
YES
M
DOES CONTROL MODULE C_3 RECEIVE CONTROL ACTIVATION SIGNAL A_2=1 ?
NO
3
YES
SET A_3=1 FLAG TO TRUE AND GENERATE ENABLE SIGNAL E_8 TO DRIVE BAR CODE READ STATE INDICATOR
O
IS ELAPSED TIME ON TIMER T_3 > 5.0 SECONDS ?
YES
P
NO
DOES CONTROL MODULE C_3 RECEIVE CONTROL ACTIVATION SIGNAL A_4=1 WITHIN 60ms?
Q
NO
R
SET DATA IN SYMBOL DECODED DATA BUFFER TO ZERO
YES
5

FIG. 23B

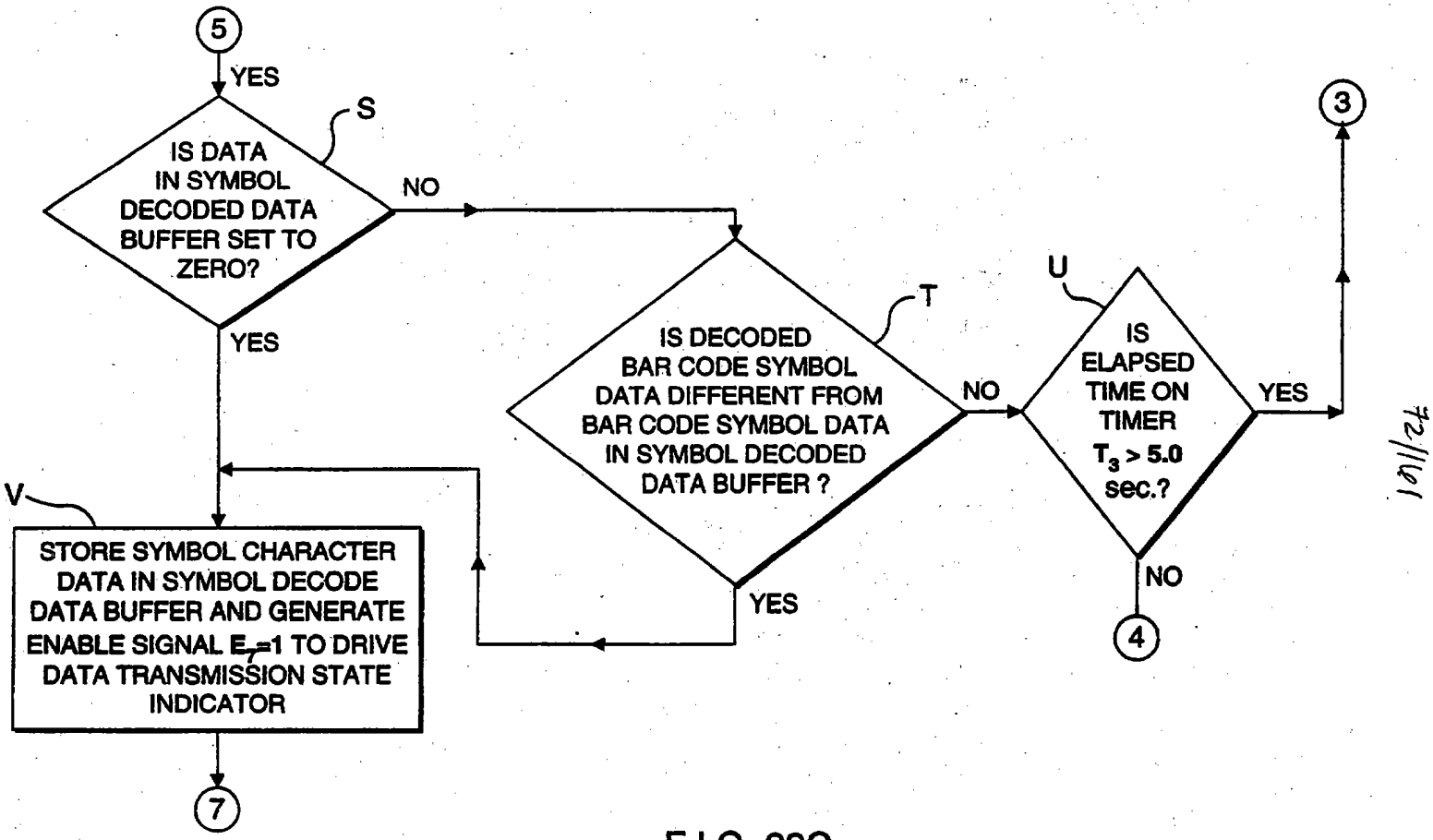

5
YES
S
IS DATA IN SYMBOL DECODED DATA BUFFER SET TO ZERO?
NO
YES
T
IS DECODED BAR CODE SYMBOL DATA DIFFERENT FROM BAR CODE SYMBOL DATA IN SYMBOL DECODED DATA BUFFER ?
NO
U
IS ELAPSED TIME ON TIMER $T_3 > 5.0$ sec.?
YES
3
NO
4
YES
V
STORE SYMBOL CHARACTER DATA IN SYMBOL DECODE DATA BUFFER AND GENERATE ENABLE SIGNAL E_7=1 TO DRIVE DATA TRANSMISSION STATE INDICATOR
7

FIG. 23C

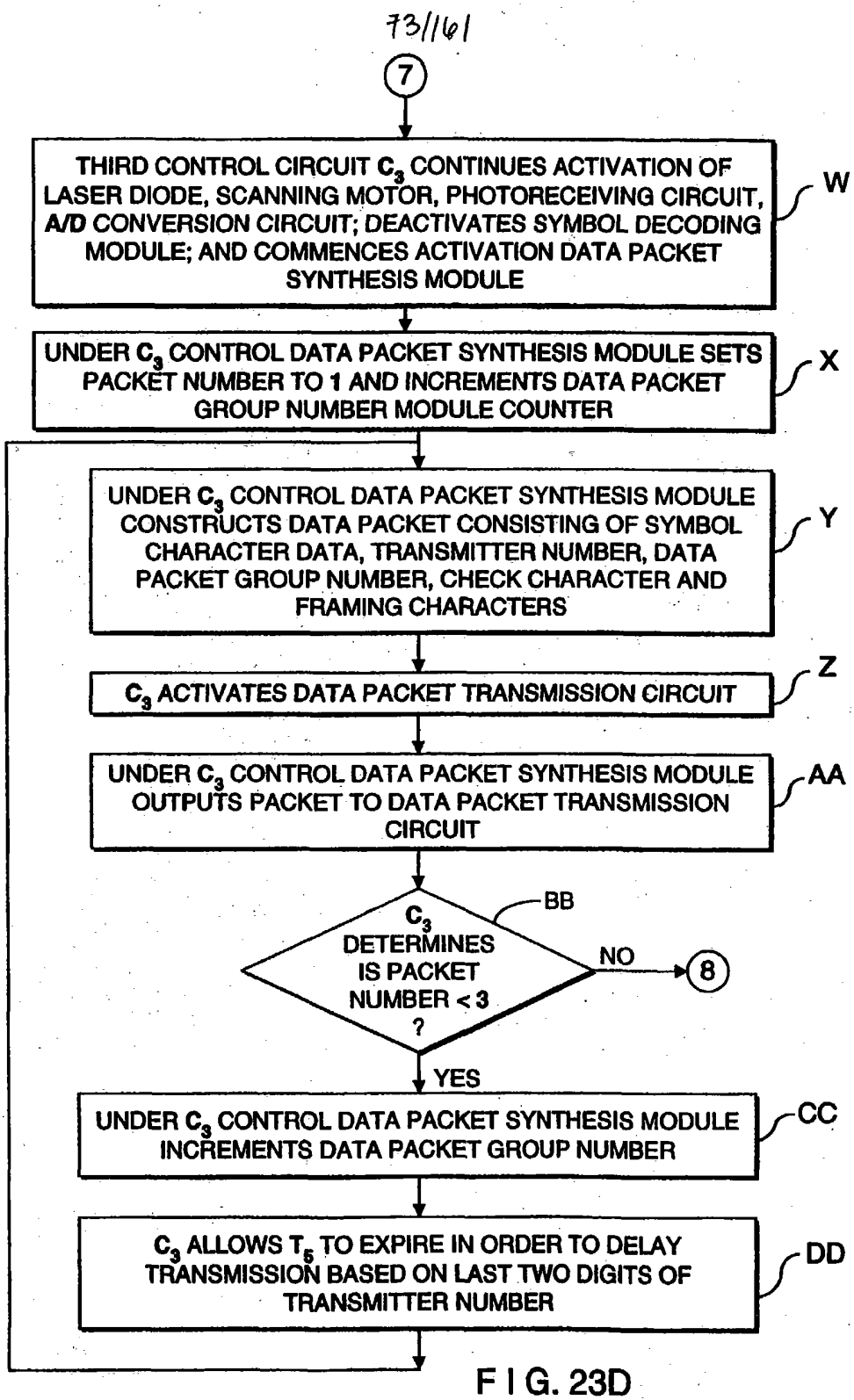

7
THIRD CONTROL CIRCUIT C_3 CONTINUES ACTIVATION OF LASER DIODE, SCANNING MOTOR, PHOTORECEIVING CIRCUIT, A/D CONVERSION CIRCUIT; DEACTIVATES SYMBOL DECODING MODULE; AND COMMENCES ACTIVATION DATA PACKET SYNTHESIS MODULE
W
UNDER C_3 CONTROL DATA PACKET SYNTHESIS MODULE SETS PACKET NUMBER TO 1 AND INCREMENTS DATA PACKET GROUP NUMBER MODULE COUNTER
X
UNDER C_3 CONTROL DATA PACKET SYNTHESIS MODULE CONSTRUCTS DATA PACKET CONSISTING OF SYMBOL CHARACTER DATA, TRANSMITTER NUMBER, DATA PACKET GROUP NUMBER, CHECK CHARACTER AND FRAMING CHARACTERS
Y
C_3 ACTIVATES DATA PACKET TRANSMISSION CIRCUIT
Z
UNDER C_3 CONTROL DATA PACKET SYNTHESIS MODULE OUTPUTS PACKET TO DATA PACKET TRANSMISSION CIRCUIT
AA
C_3 DETERMINES IS PACKET NUMBER < 3 ?
BB
NO
8
YES
UNDER C_3 CONTROL DATA PACKET SYNTHESIS MODULE INCREMENTS DATA PACKET GROUP NUMBER
CC
C_3 ALLOWS T_5 TO EXPIRE IN ORDER TO DELAY TRANSMISSION BASED ON LAST TWO DIGITS OF TRANSMITTER NUMBER
DD

FIG. 23D

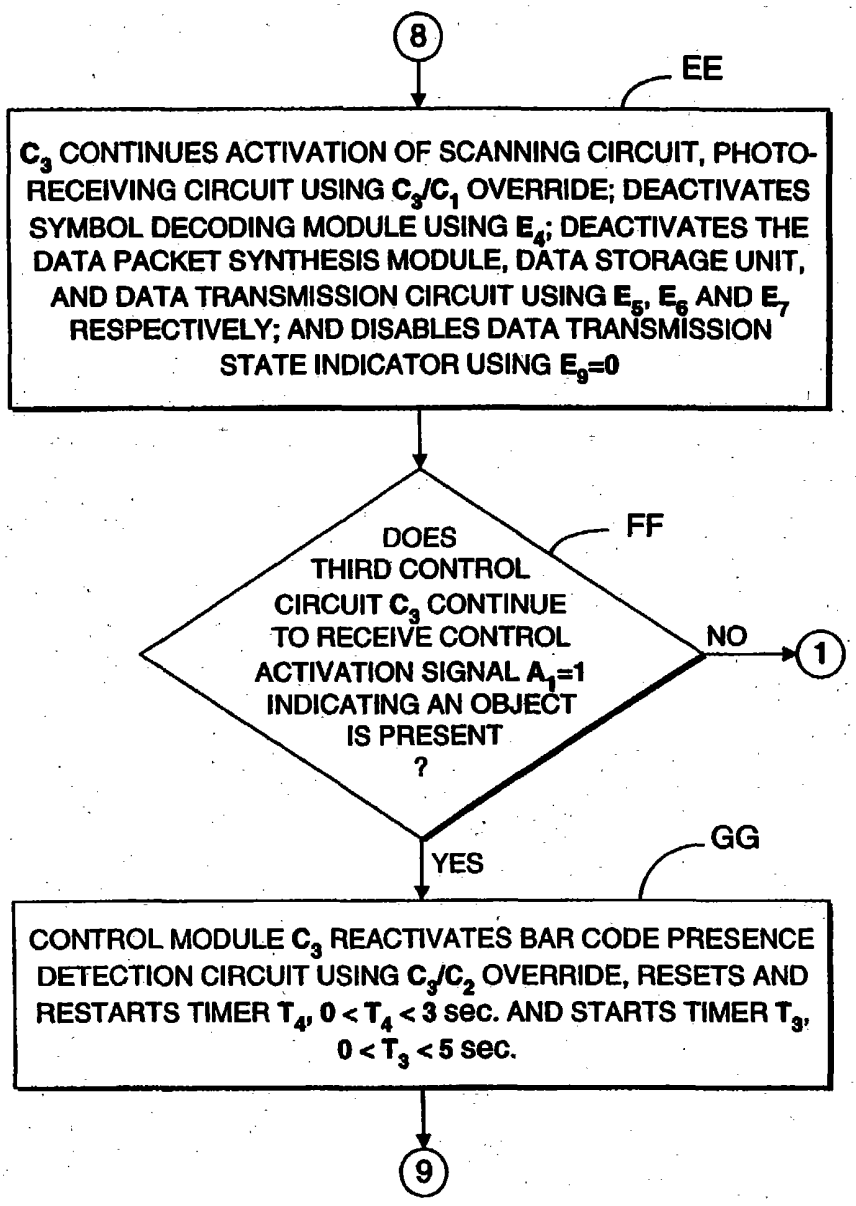

8
EE
C3 CONTINUES ACTIVATION OF SCANNING CIRCUIT, PHOTO-RECEIVING CIRCUIT USING C3/C1 OVERRIDE; DEACTIVATES SYMBOL DECODING MODULE USING E4; DEACTIVATES THE DATA PACKET SYNTHESIS MODULE, DATA STORAGE UNIT, AND DATA TRANSMISSION CIRCUIT USING E5, E6 AND E7 RESPECTIVELY; AND DISABLES DATA TRANSMISSION STATE INDICATOR USING E9=0
FF
DOES THIRD CONTROL CIRCUIT C3 CONTINUE TO RECEIVE CONTROL ACTIVATION SIGNAL A1=1 INDICATING AN OBJECT IS PRESENT ?
NO
1
YES
GG
CONTROL MODULE C3 REACTIVATES BAR CODE PRESENCE DETECTION CIRCUIT USING C3/C2 OVERRIDE, RESETS AND RESTARTS TIMER T4, 0 < T4 < 3 sec. AND STARTS TIMER T3, 0 < T3 < 5 sec.
9

FIG. 23E

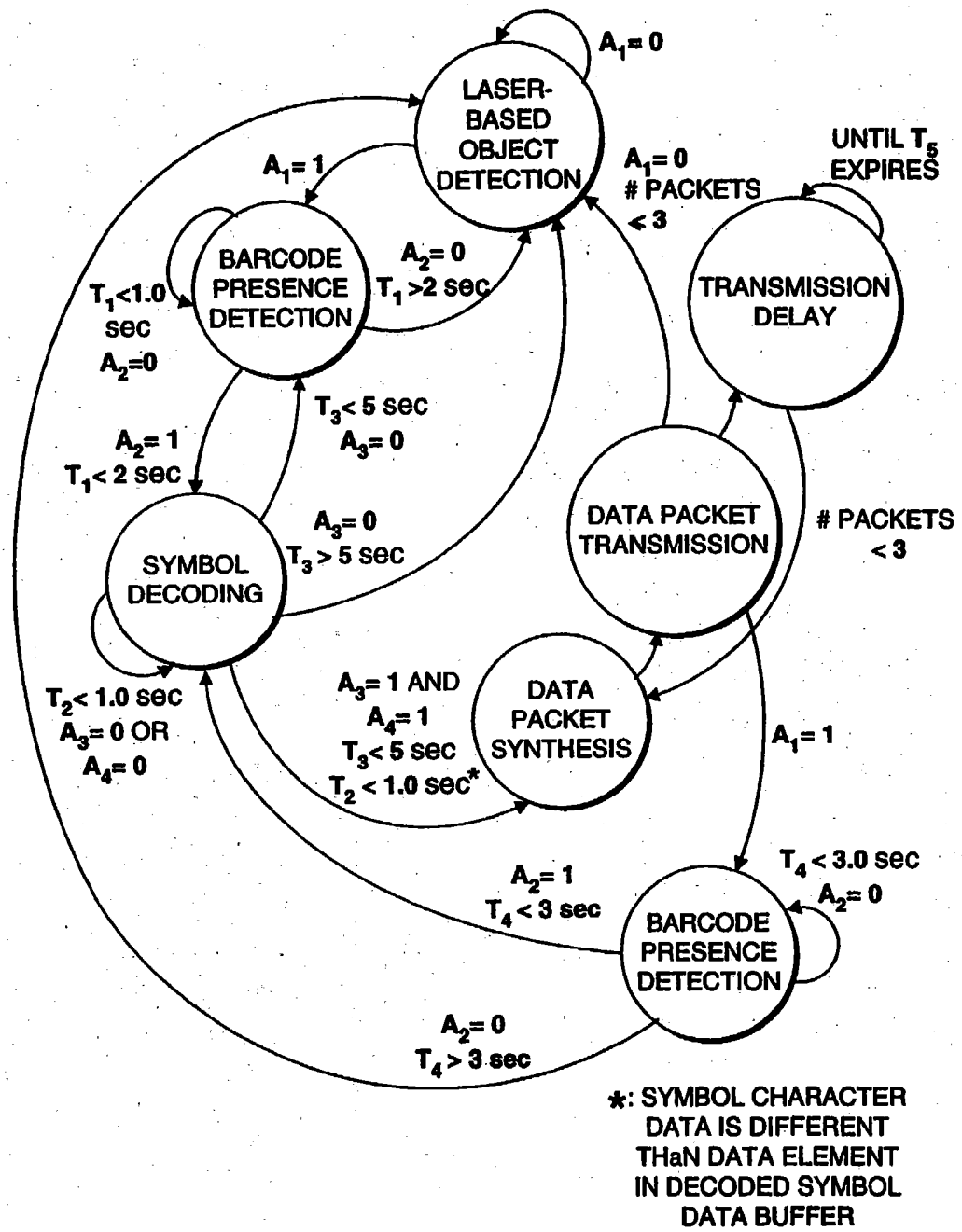

LASER-BASED OBJECT DETECTION
A1= 0
A1= 1
A1= 0
# PACKETS
< 3
UNTIL T5 EXPIRES
TRANSMISSION DELAY
BARCODE PRESENCE DETECTION
T1<1.0 sec
A2=0
A2= 0
T1 >2 sec
T3< 5 sec
A3= 0
A2= 1
T1< 2 sec
A3= 0
T3 > 5 sec
SYMBOL DECODING
DATA PACKET TRANSMISSION
PACKETS
< 3
T2< 1.0 sec
A3= 0 OR
A4= 0
A3= 1 AND
A4= 1
T3< 5 sec
T2 < 1.0 sec*
DATA PACKET SYNTHESIS
A1= 1
T4 < 3.0 sec
A2= 0
A2= 1
T4 < 3 sec
BARCODE PRESENCE DETECTION
A2= 0
T4 > 3 sec
*: SYMBOL CHARACTER DATA IS DIFFERENT THaN DATA ELEMENT IN DECODED SYMBOL DATA BUFFER

FIG. 24

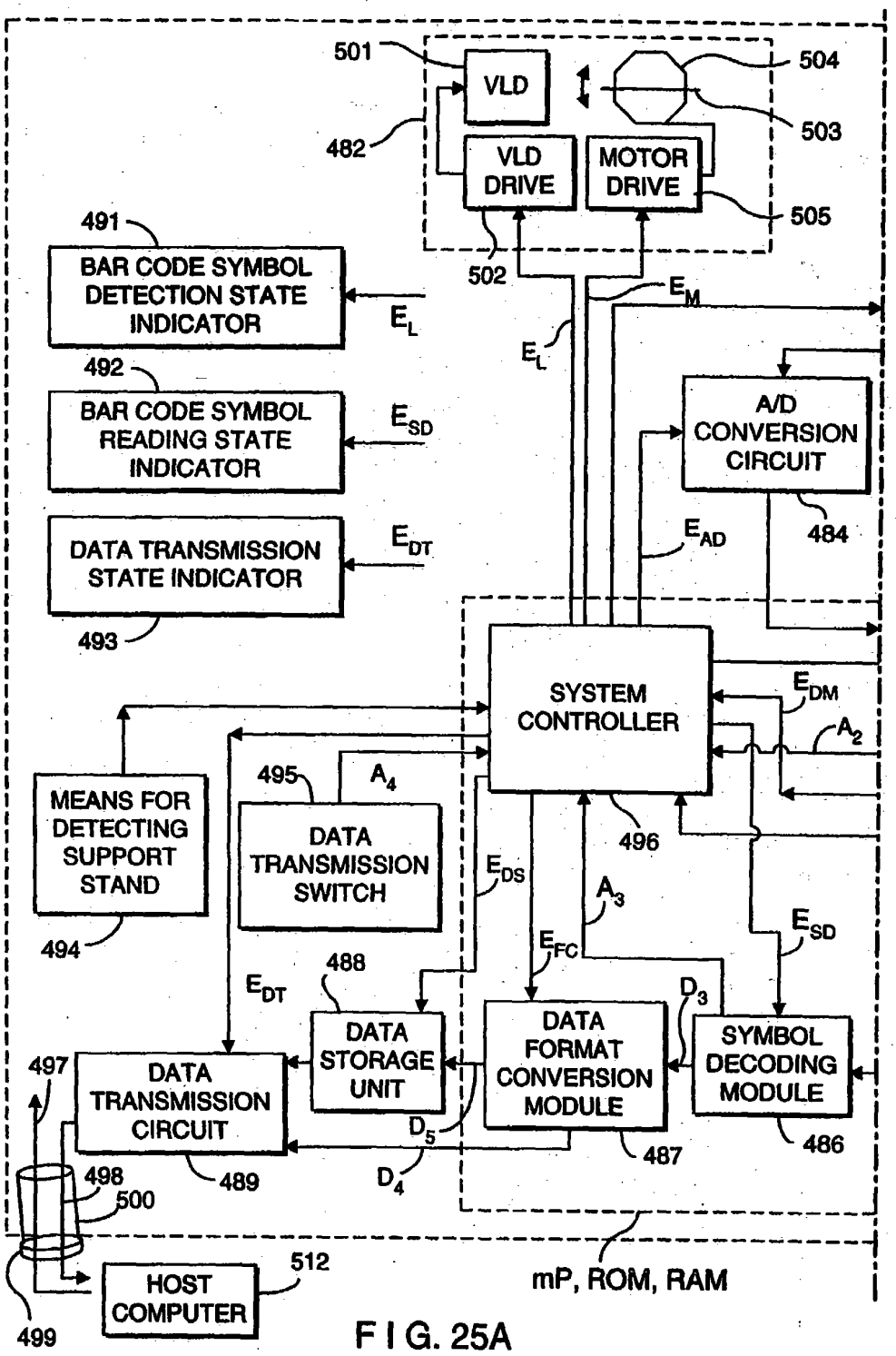

501
VLD
504
503
482
VLD DRIVE
MOTOR DRIVE
505
491
BAR CODE SYMBOL DETECTION STATE INDICATOR
502
E_M
E_L
E_L
492
BAR CODE SYMBOL READING STATE INDICATOR
E_{SD}
A/D CONVERSION CIRCUIT
E_{DT}
DATA TRANSMISSION STATE INDICATOR
E_{AD}
484
493
SYSTEM CONTROLLER
E_{DM}
A_2
MEANS FOR DETECTING SUPPORT STAND
495
A_4
DATA TRANSMISSION SWITCH
496
E_{DS}
A_3
E_{FC}
E_{SD}
494
E_{DT}
488
D_3
DATA STORAGE UNIT
DATA FORMAT CONVERSION MODULE
SYMBOL DECODING MODULE
497
DATA TRANSMISSION CIRCUIT
D_5
487
486
498
500
489
D_4
512
HOST COMPUTER
mP, ROM, RAM
499

FIG. 25A

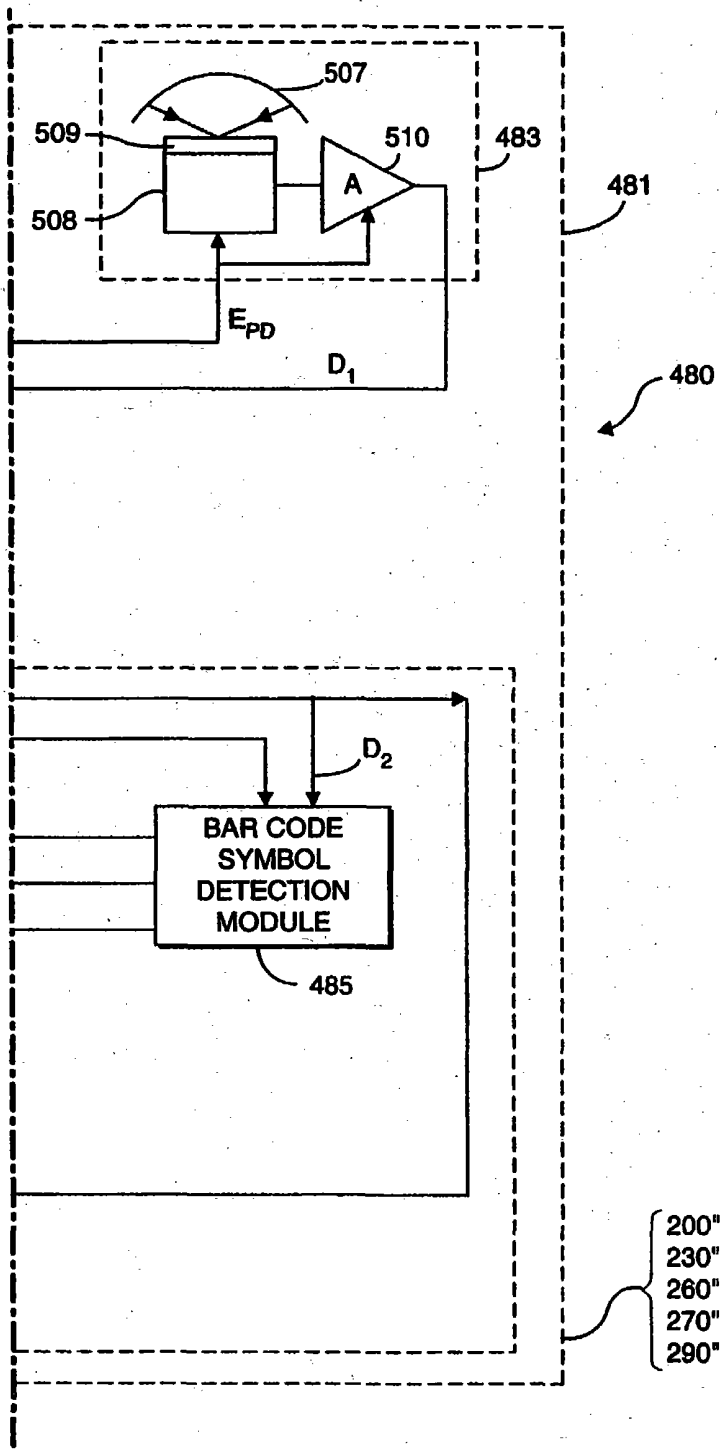

507
509
510
483
A
481
508
E_{PD}
D_1
480
D_2
BAR CODE SYMBOL DETECTION MODULE
485
200"
230"
260"
270"
290"

FIG. 25B

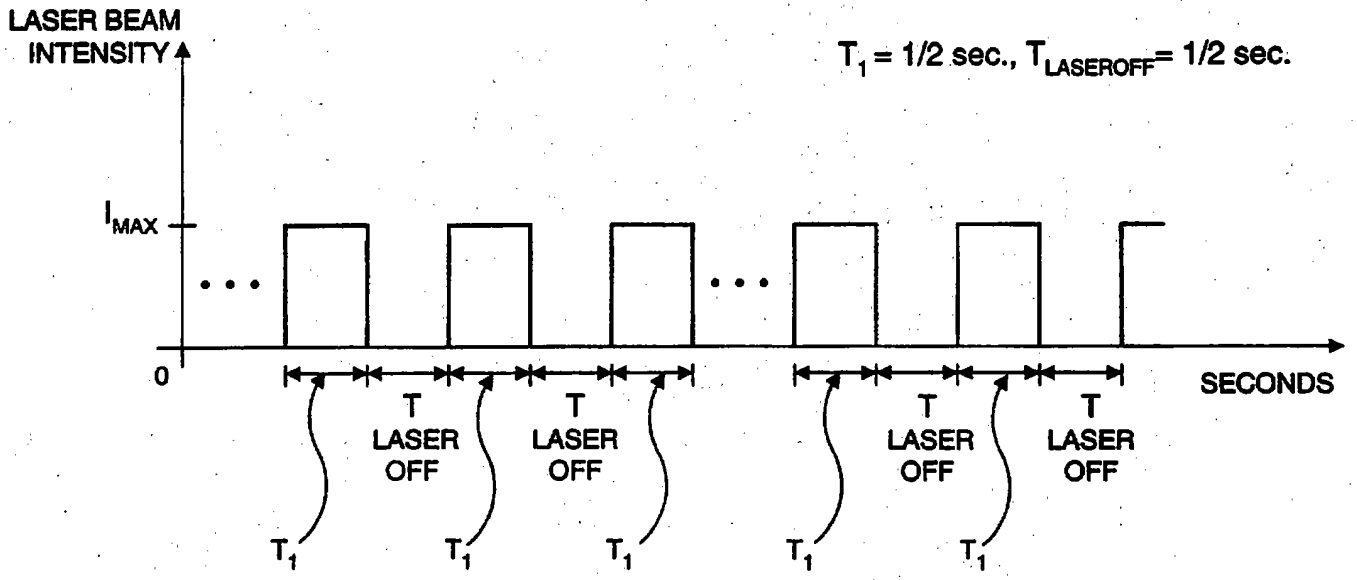

LASER BEAM INTENSITY
T_1 = 1/2 sec., $T_{LASEROFF}$ = 1/2 sec.
I_{MAX}
0
SECONDS
T LASER OFF
T LASER OFF
T LASER OFF
T LASER OFF
T LASER OFF
T_1
T_1
T_1
T_1
T_1

FIG. 26

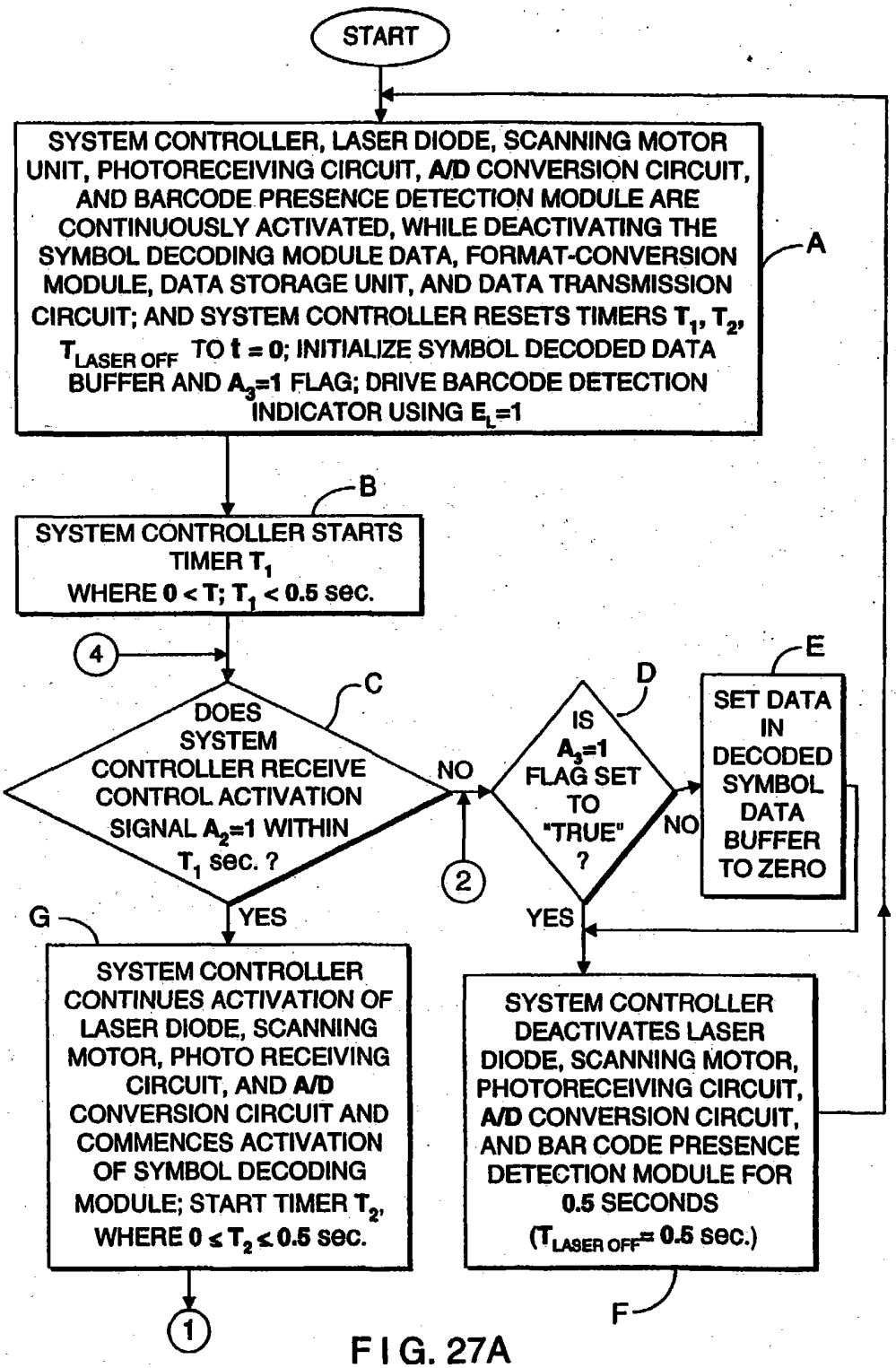

START
SYSTEM CONTROLLER, LASER DIODE, SCANNING MOTOR UNIT, PHOTORECEIVING CIRCUIT, A/D CONVERSION CIRCUIT, AND BARCODE PRESENCE DETECTION MODULE ARE CONTINUOUSLY ACTIVATED, WHILE DEACTIVATING THE SYMBOL DECODING MODULE DATA, FORMAT-CONVERSION MODULE, DATA STORAGE UNIT, AND DATA TRANSMISSION CIRCUIT; AND SYSTEM CONTROLLER RESETS TIMERS T_1, T_2, $T_{LASER\ OFF}$ TO t = 0; INITIALIZE SYMBOL DECODED DATA BUFFER AND A_3=1 FLAG; DRIVE BARCODE DETECTION INDICATOR USING E_L=1
A
B
SYSTEM CONTROLLER STARTS TIMER T_1 WHERE 0 < T; T_1 < 0.5 sec.
4
C
DOES SYSTEM CONTROLLER RECEIVE CONTROL ACTIVATION SIGNAL A_2=1 WITHIN T_1 sec. ?
NO
YES
D
IS A_3=1 FLAG SET TO "TRUE" ?
NO
YES
E
SET DATA IN DECODED SYMBOL DATA BUFFER TO ZERO
2
G
SYSTEM CONTROLLER CONTINUES ACTIVATION OF LASER DIODE, SCANNING MOTOR, PHOTO RECEIVING CIRCUIT, AND A/D CONVERSION CIRCUIT AND COMMENCES ACTIVATION OF SYMBOL DECODING MODULE; START TIMER T_2, WHERE 0 ≤ T_2 ≤ 0.5 sec.
SYSTEM CONTROLLER DEACTIVATES LASER DIODE, SCANNING MOTOR, PHOTORECEIVING CIRCUIT, A/D CONVERSION CIRCUIT, AND BAR CODE PRESENCE DETECTION MODULE FOR 0.5 SECONDS ($T_{LASER\ OFF}$= 0.5 sec.)
F
1

FIG. 27A

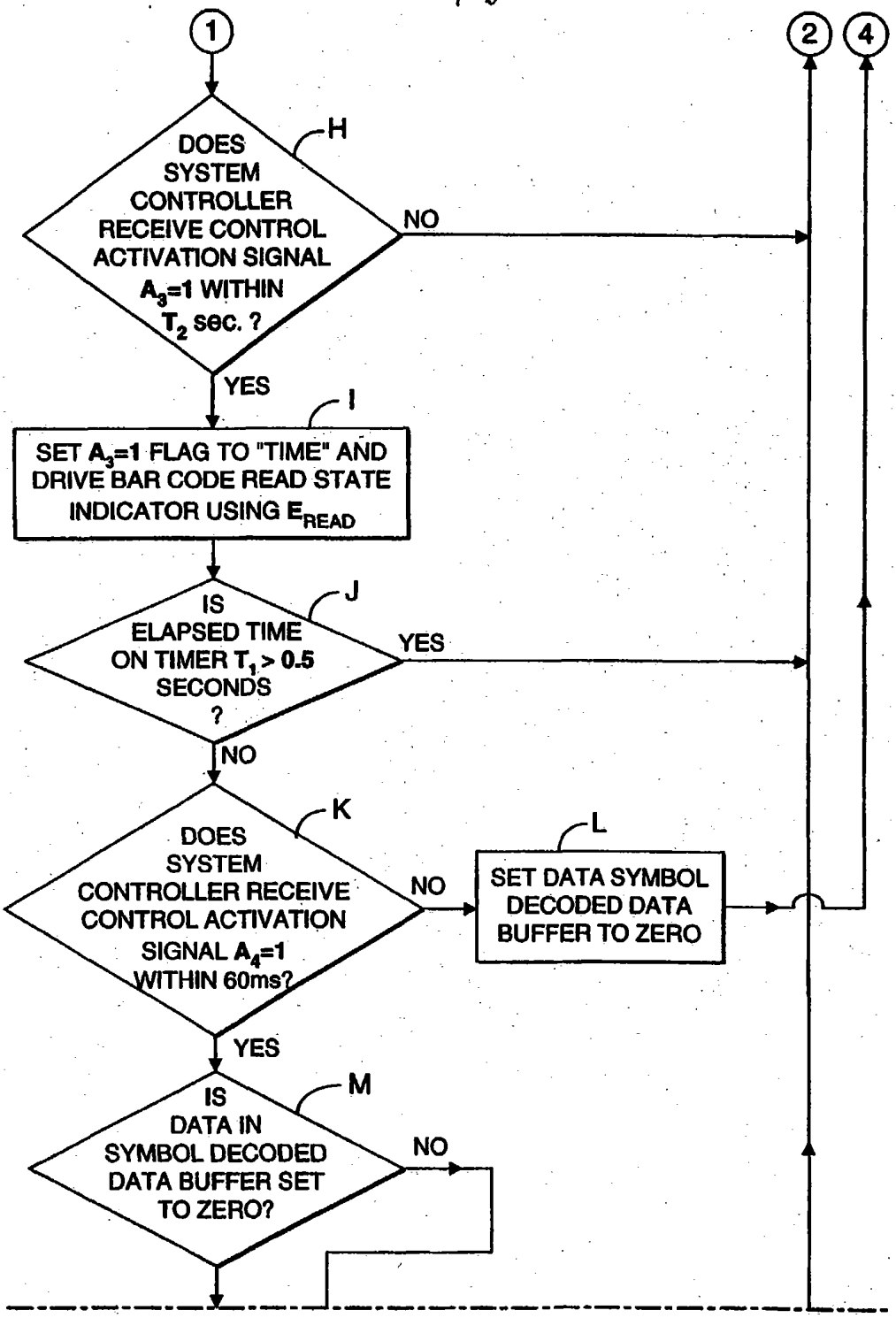

1
2
4
H
DOES SYSTEM CONTROLLER RECEIVE CONTROL ACTIVATION SIGNAL A_3=1 WITHIN T_2 sec. ?
NO
YES
I
SET A_3=1 FLAG TO "TIME" AND DRIVE BAR CODE READ STATE INDICATOR USING E_{READ}
J
IS ELAPSED TIME ON TIMER T_1 > 0.5 SECONDS ?
YES
NO
K
DOES SYSTEM CONTROLLER RECEIVE CONTROL ACTIVATION SIGNAL A_4=1 WITHIN 60ms?
NO
L
SET DATA SYMBOL DECODED DATA BUFFER TO ZERO
YES
M
IS DATA IN SYMBOL DECODED DATA BUFFER SET TO ZERO?
NO

FIG. 27B1

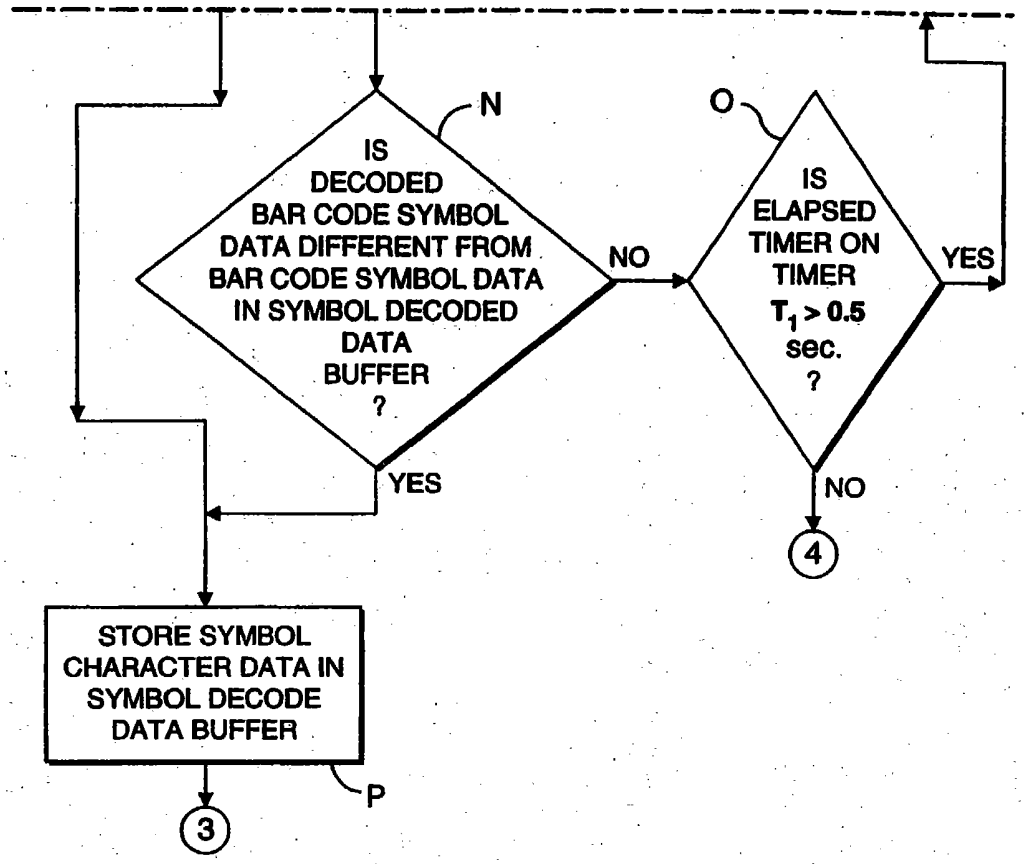

N
IS DECODED BAR CODE SYMBOL DATA DIFFERENT FROM BAR CODE SYMBOL DATA IN SYMBOL DECODED DATA BUFFER ?
NO
O
IS ELAPSED TIMER ON TIMER $T_1 > 0.5$ sec. ?
YES
NO
4
YES
STORE SYMBOL CHARACTER DATA IN SYMBOL DECODE DATA BUFFER
P
3

FIG. 27B2

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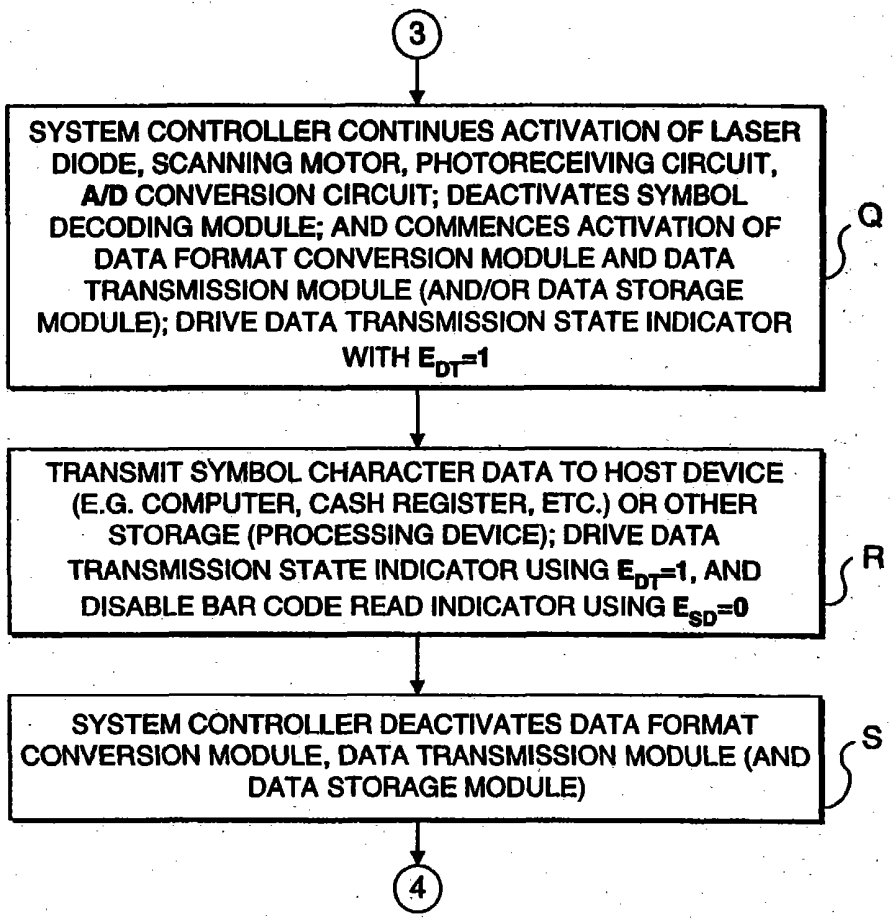

FIG. 27C

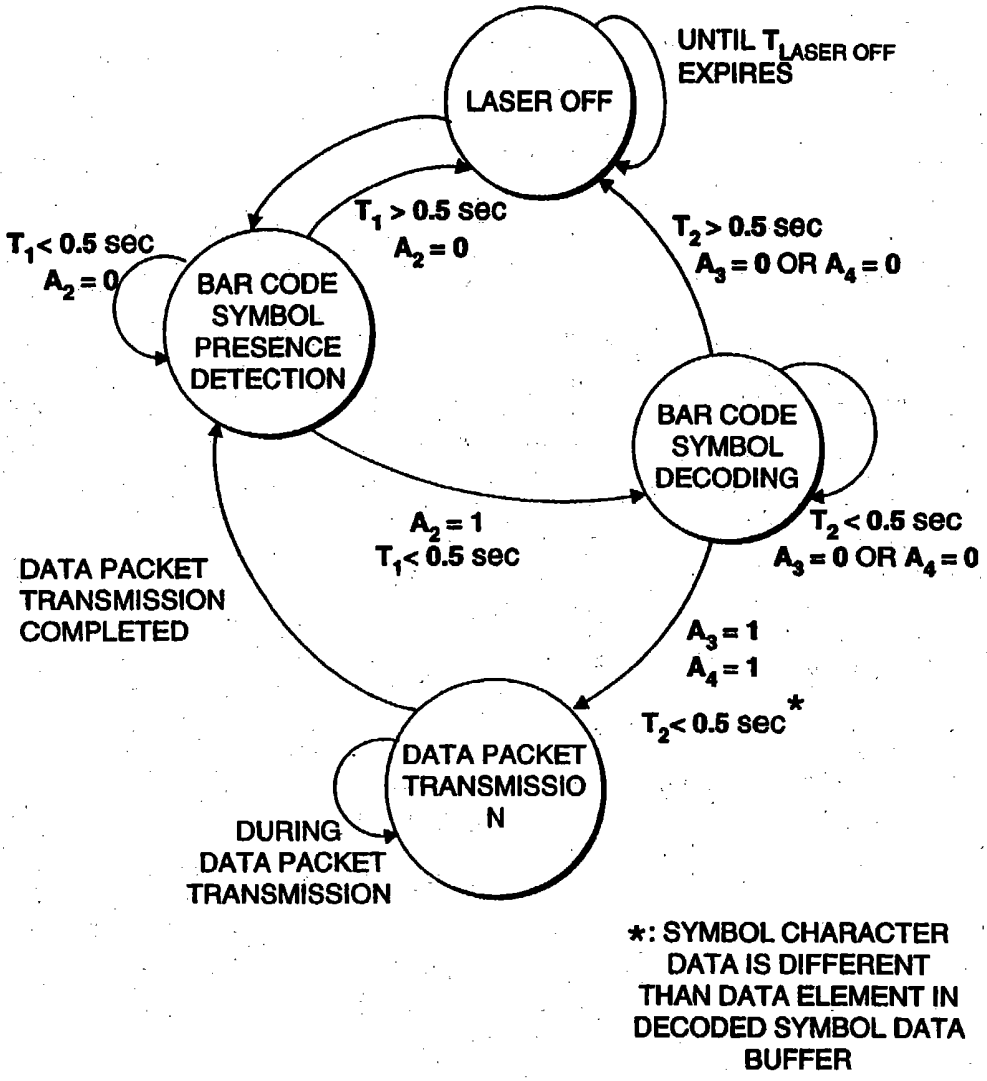
LASER OFF
UNTIL $T_{LASER\ OFF}$ EXPIRES
BAR CODE SYMBOL PRESENCE DETECTION
$T_1 < 0.5$ sec
$A_2 = 0$
$T_1 > 0.5$ sec
$A_2 = 0$
$T_2 > 0.5$ sec
$A_3 = 0$ OR $A_4 = 0$
BAR CODE SYMBOL DECODING
$T_2 < 0.5$ sec
$A_3 = 0$ OR $A_4 = 0$
$A_2 = 1$
$T_1 < 0.5$ sec
DATA PACKET TRANSMISSION COMPLETED
$A_3 = 1$
$A_4 = 1$
$T_2 < 0.5$ sec*
DATA PACKET TRANSMISSIO N
DURING DATA PACKET TRANSMISSION
*: SYMBOL CHARACTER DATA IS DIFFERENT THAN DATA ELEMENT IN DECODED SYMBOL DATA BUFFER

FIG. 28

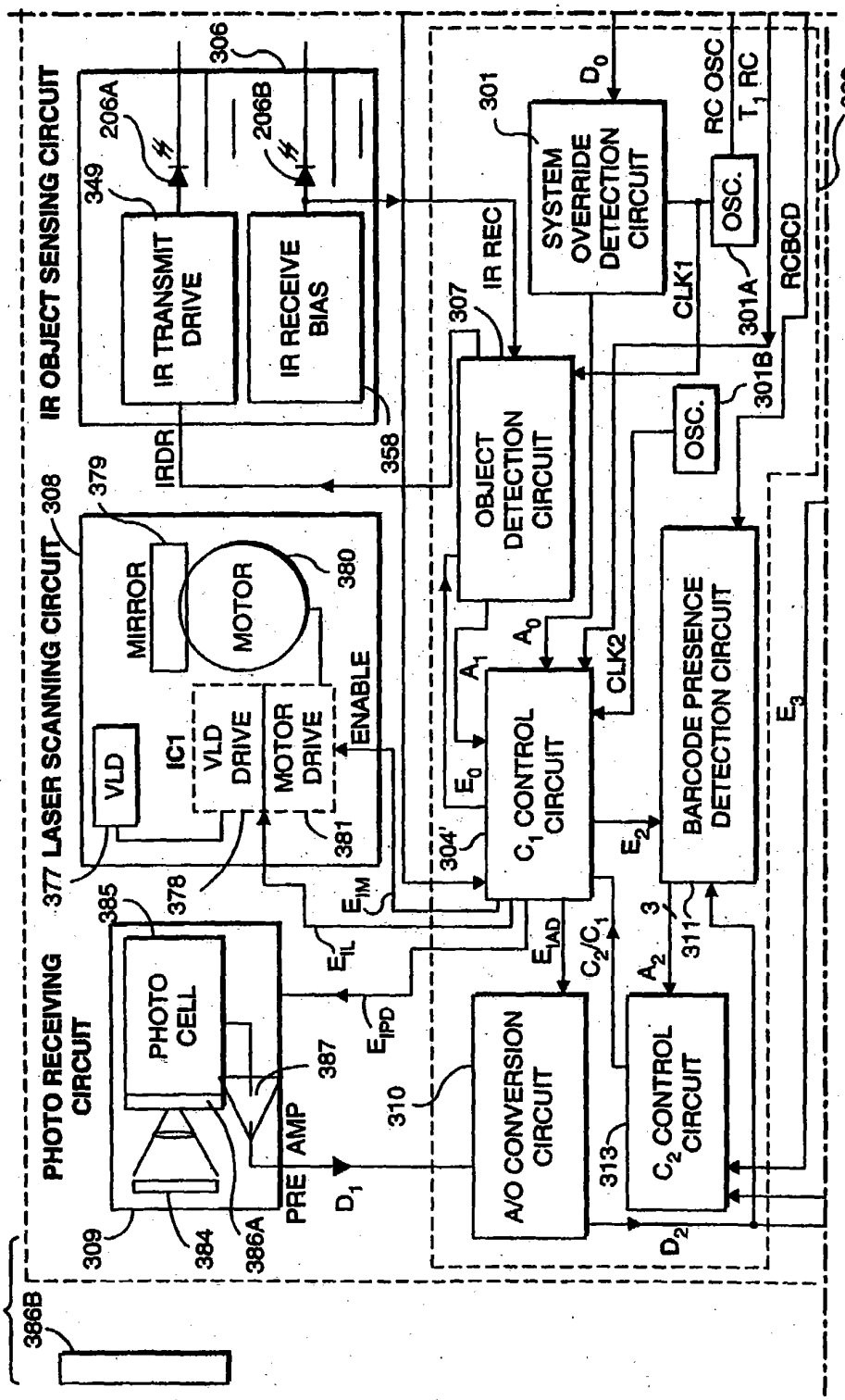
IR OBJECT SENSING CIRCUIT
LASER SCANNING CIRCUIT
PHOTO RECEIVING CIRCUIT
IR TRANSMIT DRIVE
IR RECEIVE BIAS
IRDR
IR REC
MIRROR
MOTOR
VLD
IC1
VLD DRIVE
MOTOR DRIVE
ENABLE
PHOTO CELL
AMP
PRE
OBJECT DETECTION CIRCUIT
SYSTEM OVERRIDE DETECTION CIRCUIT
C1 CONTROL CIRCUIT
A/O CONVERSION CIRCUIT
C2 CONTROL CIRCUIT
BARCODE PRESENCE DETECTION CIRCUIT
OSC.
RC OSC
T1 RC
RCBCD
CLK1
CLK2
206A
206B
306
349
358
307
301
301A
301B
333
308
379
380
381
377
378
385
387
309
384
386A
386B
304'
310
313
311
3
D0
D1
D2
A0
A1
A2
E0
E2
E3
EIM
EIL
EIPD
EIAD
C2/C1

FIG. 29A1

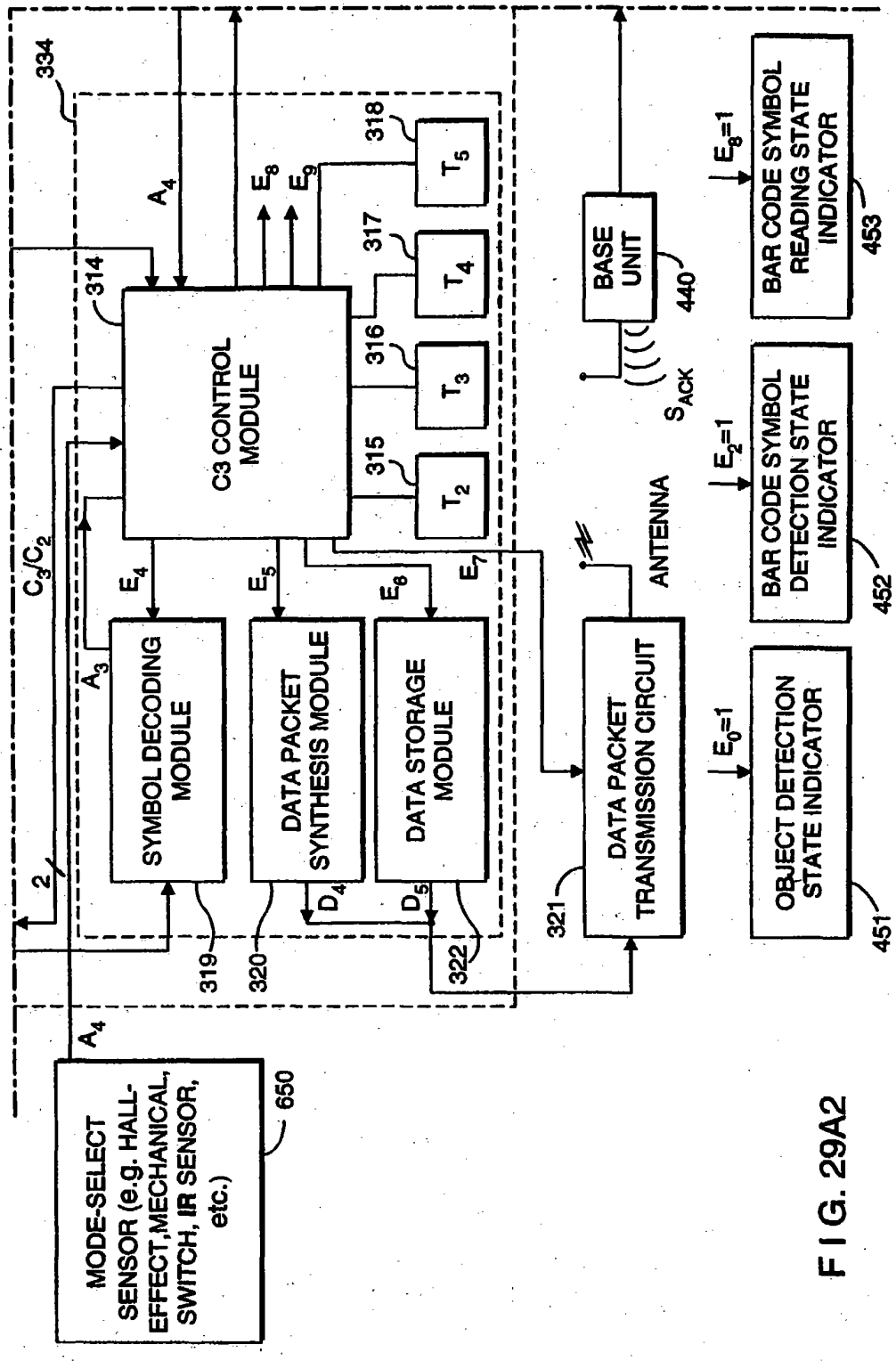
334
314
C3 CONTROL MODULE
A_4
E_8
E_9
318
T_5
317
T_4
316
T_3
315
T_2
C_3/C_2
E_4
E_5
E_6
E_7
A_3
SYMBOL DECODING MODULE
DATA PACKET SYNTHESIS MODULE
DATA STORAGE MODULE
2
319
320
322
D_4
D_5
321
DATA PACKET TRANSMISSION CIRCUIT
ANTENNA
BASE UNIT
440
S_{ACK}
E_8=1
BAR CODE SYMBOL READING STATE INDICATOR
453
E_2=1
BAR CODE SYMBOL DETECTION STATE INDICATOR
452
E_0=1
OBJECT DETECTION STATE INDICATOR
451
A_4
MODE-SELECT SENSOR (e.g. HALL-EFFECT, MECHANICAL, SWITCH, IR SENSOR, etc.)
650

FIG. 29A2

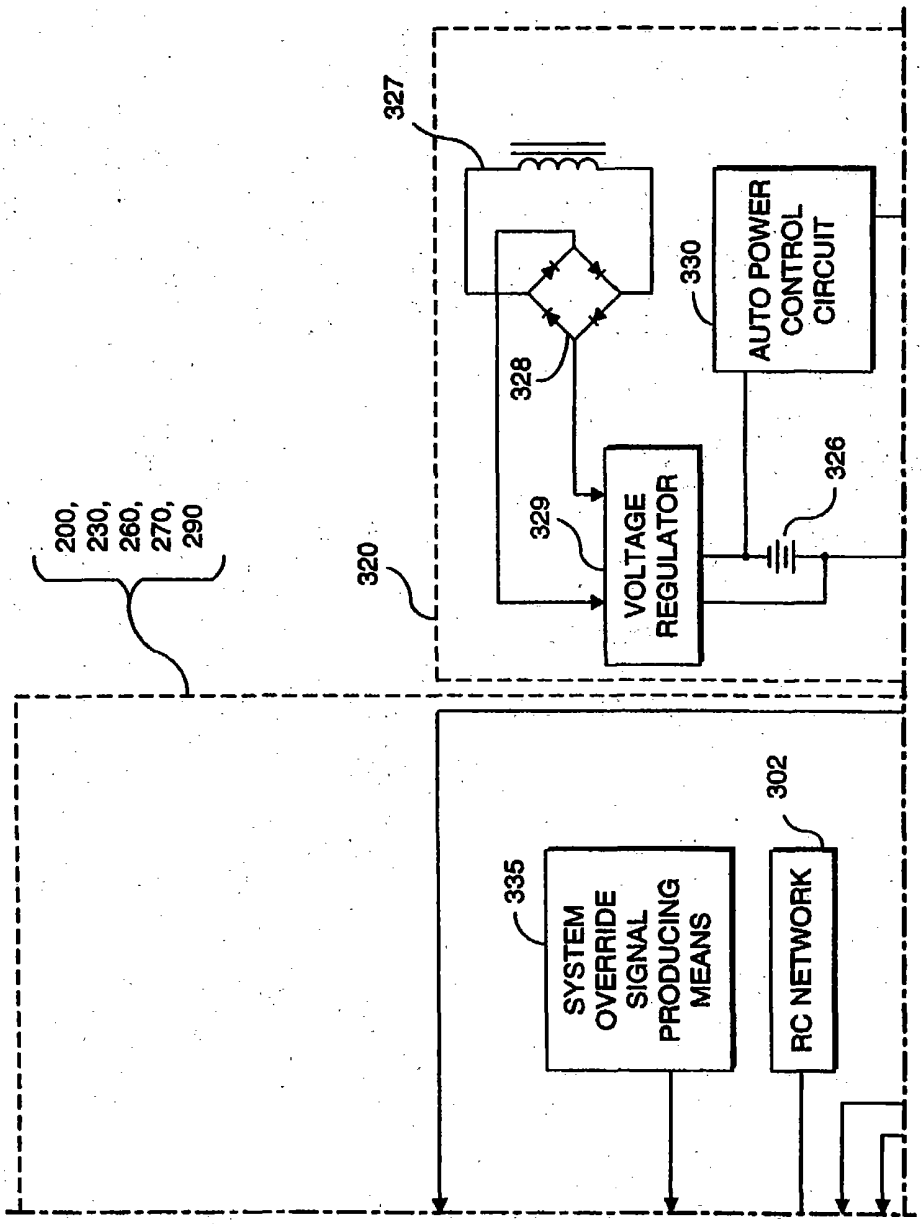
200,
230,
260,
270,
290
320
327
328
329
330
326
VOLTAGE REGULATOR
AUTO POWER CONTROL CIRCUIT
335
SYSTEM OVERRIDE SIGNAL PRODUCING MEANS
302
RC NETWORK

FIG. 29A3

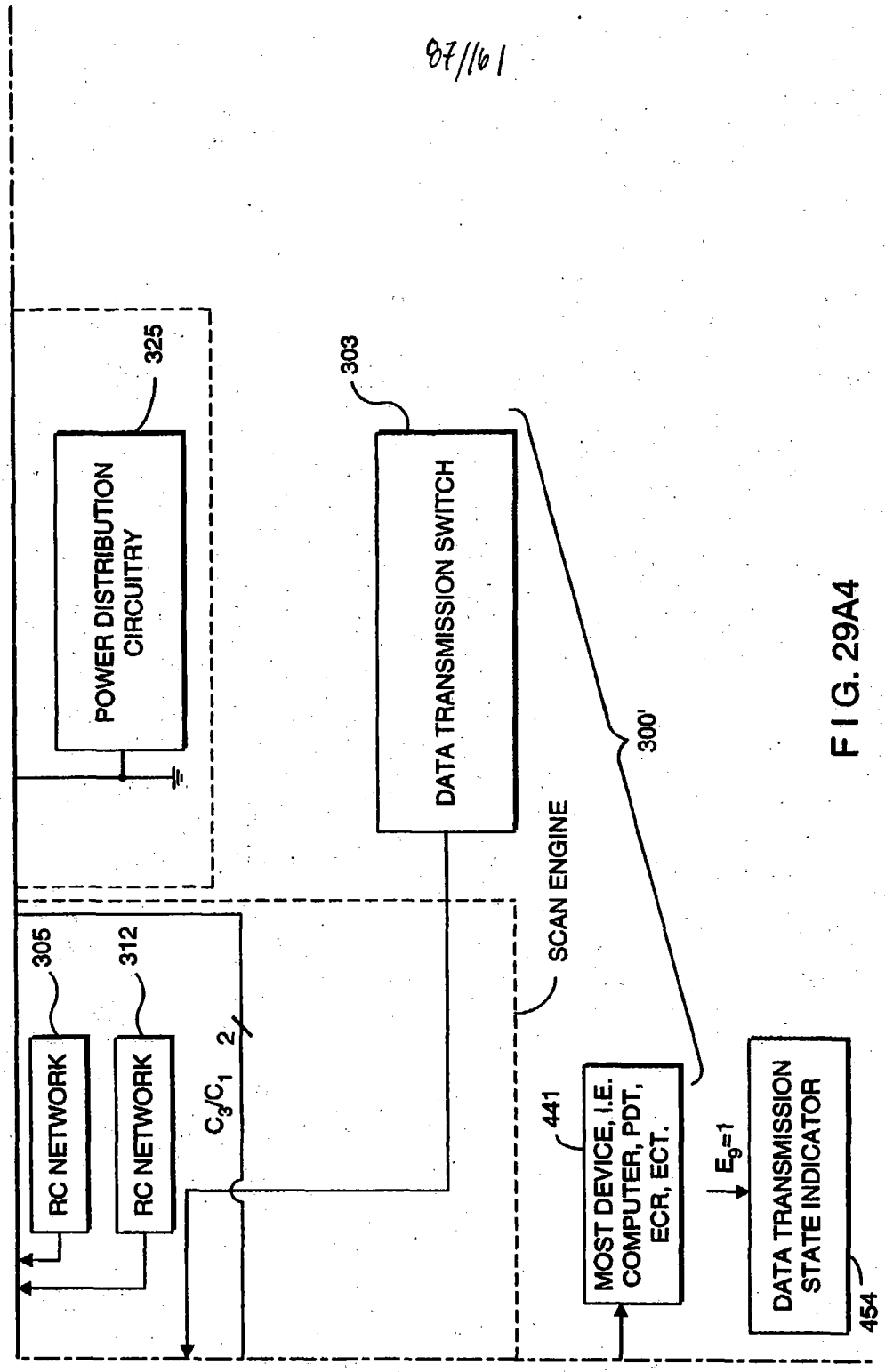
325
POWER DISTRIBUTION CIRCUITRY
303
DATA TRANSMISSION SWITCH
300'
SCAN ENGINE
305
RC NETWORK
312
RC NETWORK
C_3/C_1 2
441
MOST DEVICE, I.E. COMPUTER, PDT, ECR, ECT.
E_9=1
DATA TRANSMISSION STATE INDICATOR
454

FIG. 29A4

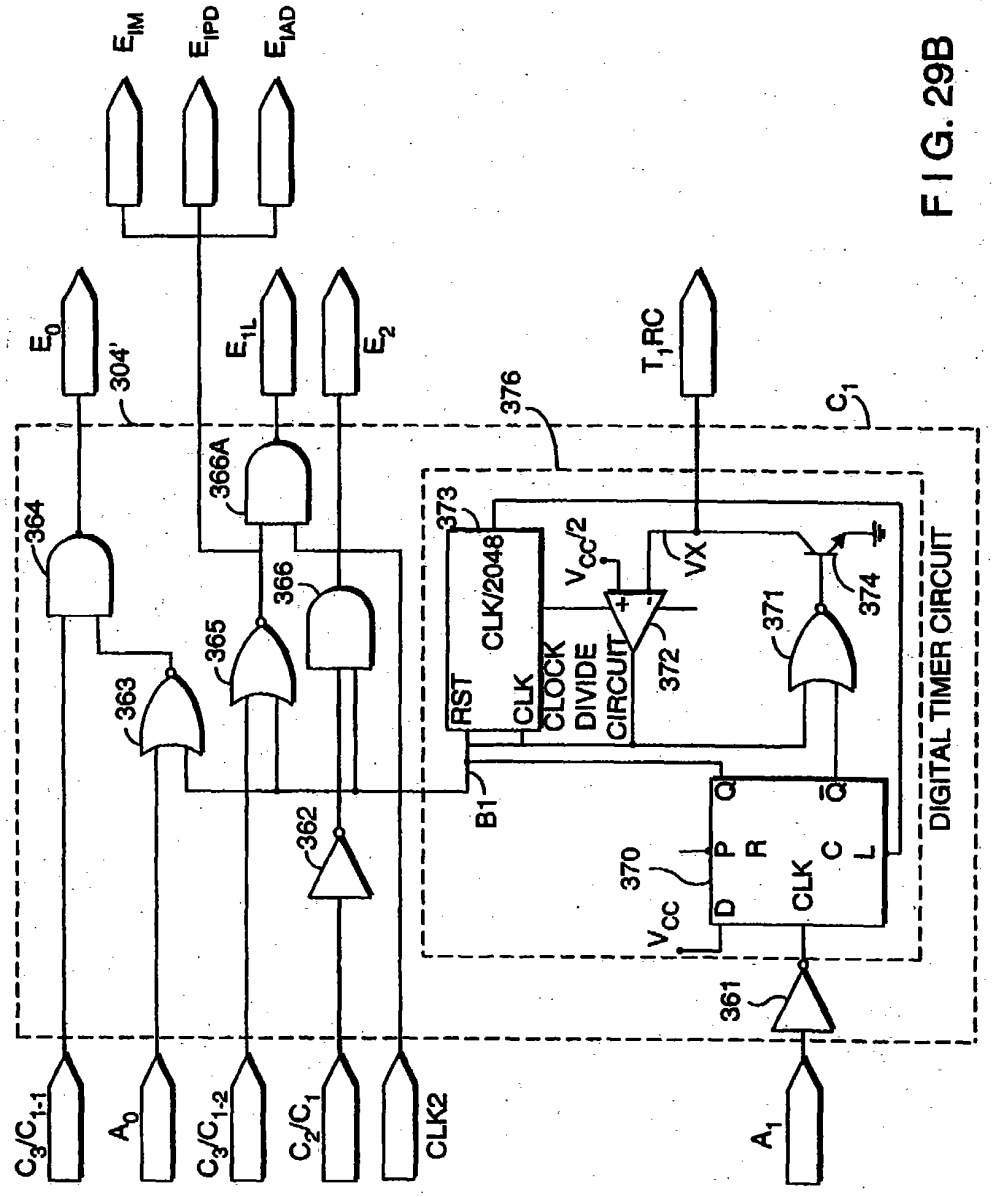
E_IM
E_IPD
E_IAD
E_0
304'
E_1L
E_2
T_1RC
376
C_1
364
366A
373
366
365
CLK/2048
V_CC/2
VX
374
371
363
RST
CLK
CLOCK DIVIDE CIRCUIT
372
B1
Q
P
R
C
L
D
CLK
370
V_CC
362
361
DIGITAL TIMER CIRCUIT
C_3/C_1-1
A_0
C_3/C_1-2
C_2/C_1
CLK2
A_1

FIG. 29B

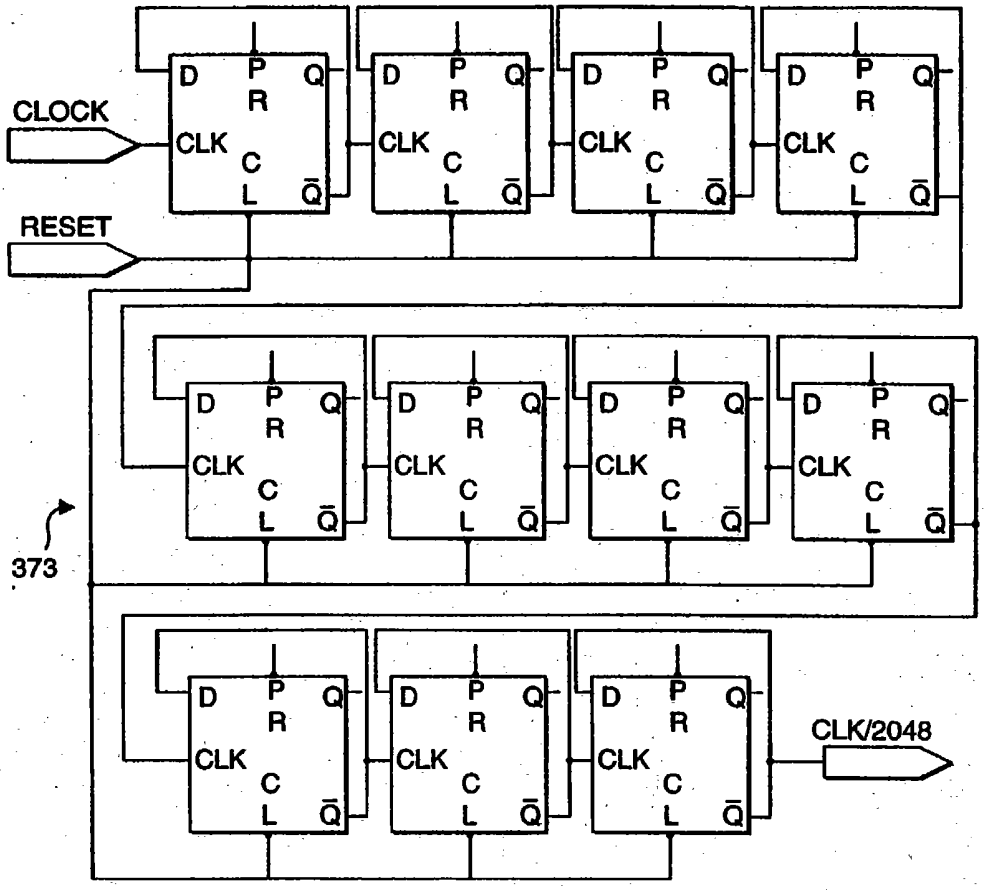

FIG. 29C

$$\begin{cases} E_0 = \overline{(B1 + A_0)\,(C_3 / C_{1-1})} \\ E_{IM} = E_{IPD} = E_{IAD} = \overline{(C_3 / C_{1-2}) + B1} \\ E_L = \overline{[(C_3 / C_{1-1}) + B1]\,[B2]} \\ E_2 = \overline{(C_2 / C_1)}\,(B1) \end{cases}$$

FIG. 29D

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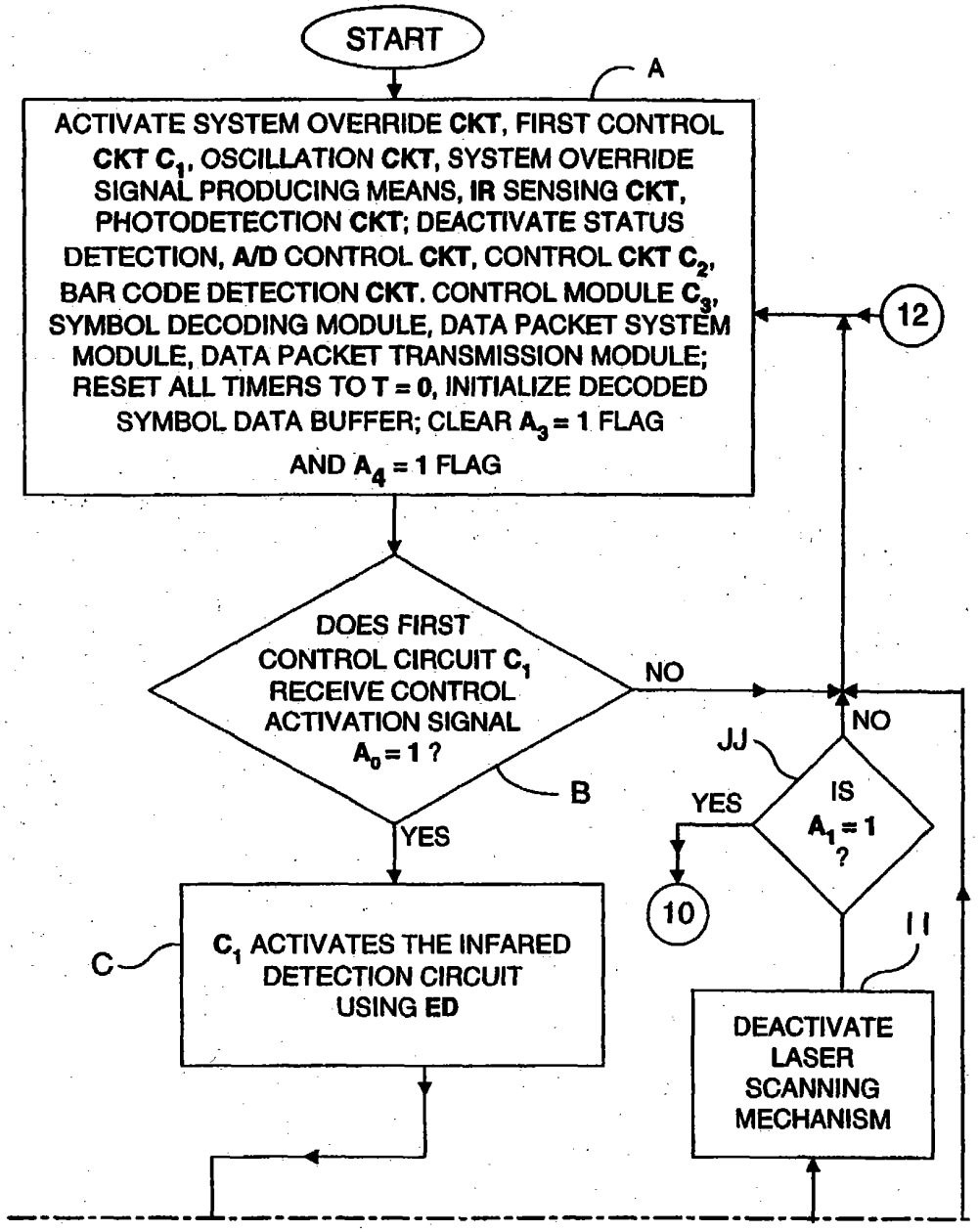


FIG. 30A1

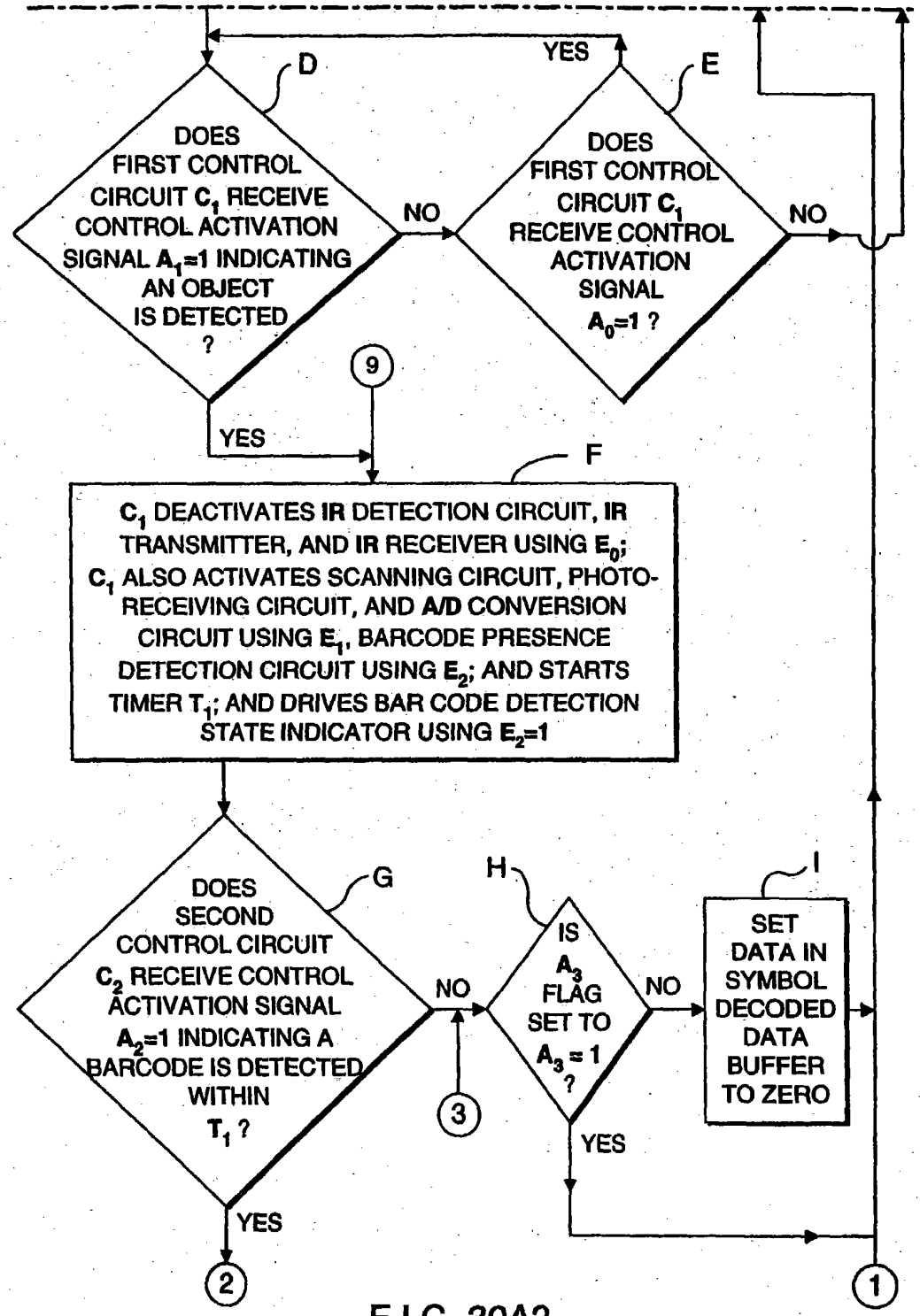

D
DOES FIRST CONTROL CIRCUIT C_1 RECEIVE CONTROL ACTIVATION SIGNAL A_1=1 INDICATING AN OBJECT IS DETECTED ?
NO
E
DOES FIRST CONTROL CIRCUIT C_1 RECEIVE CONTROL ACTIVATION SIGNAL A_0=1 ?
YES
NO
9
YES
F
C_1 DEACTIVATES IR DETECTION CIRCUIT, IR TRANSMITTER, AND IR RECEIVER USING E_0; C_1 ALSO ACTIVATES SCANNING CIRCUIT, PHOTO-RECEIVING CIRCUIT, AND A/D CONVERSION CIRCUIT USING E_1, BARCODE PRESENCE DETECTION CIRCUIT USING E_2; AND STARTS TIMER T_1; AND DRIVES BAR CODE DETECTION STATE INDICATOR USING E_2=1
G
DOES SECOND CONTROL CIRCUIT C_2 RECEIVE CONTROL ACTIVATION SIGNAL A_2=1 INDICATING A BARCODE IS DETECTED WITHIN T_1 ?
NO
H
IS A_3 FLAG SET TO A_3 = 1 ?
NO
I
SET DATA IN SYMBOL DECODED DATA BUFFER TO ZERO
YES
YES
3
2
1

FIG. 30A2

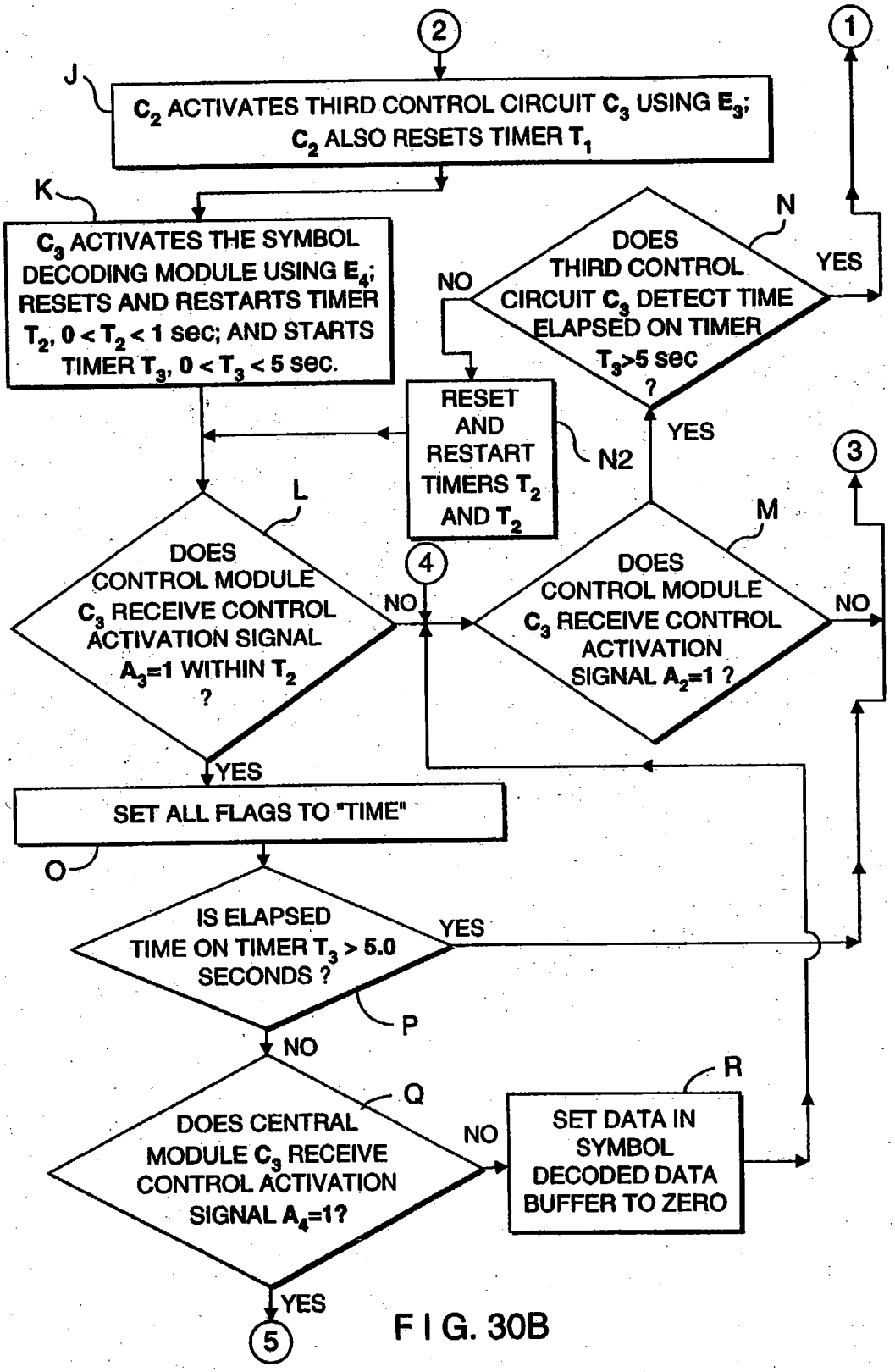

2
1
J
C_2 ACTIVATES THIRD CONTROL CIRCUIT C_3 USING E_3; C_2 ALSO RESETS TIMER T_1
K
C_3 ACTIVATES THE SYMBOL DECODING MODULE USING E_4; RESETS AND RESTARTS TIMER T_2, $0 < T_2 < 1$ sec; AND STARTS TIMER T_3, $0 < T_3 < 5$ sec.
N
DOES THIRD CONTROL CIRCUIT C_3 DETECT TIME ELAPSED ON TIMER T_3>5 sec ?
YES
NO
RESET AND RESTART TIMERS T_2 AND T_2
N2
YES
3
L
M
4
DOES CONTROL MODULE C_3 RECEIVE CONTROL ACTIVATION SIGNAL A_3=1 WITHIN T_2 ?
NO
DOES CONTROL MODULE C_3 RECEIVE CONTROL ACTIVATION SIGNAL A_2=1 ?
NO
YES
SET ALL FLAGS TO "TIME"
O
IS ELAPSED TIME ON TIMER T_3 > 5.0 SECONDS ?
YES
P
NO
Q
R
DOES CENTRAL MODULE C_3 RECEIVE CONTROL ACTIVATION SIGNAL A_4=1?
NO
SET DATA IN SYMBOL DECODED DATA BUFFER TO ZERO
YES
5

FIG. 30B

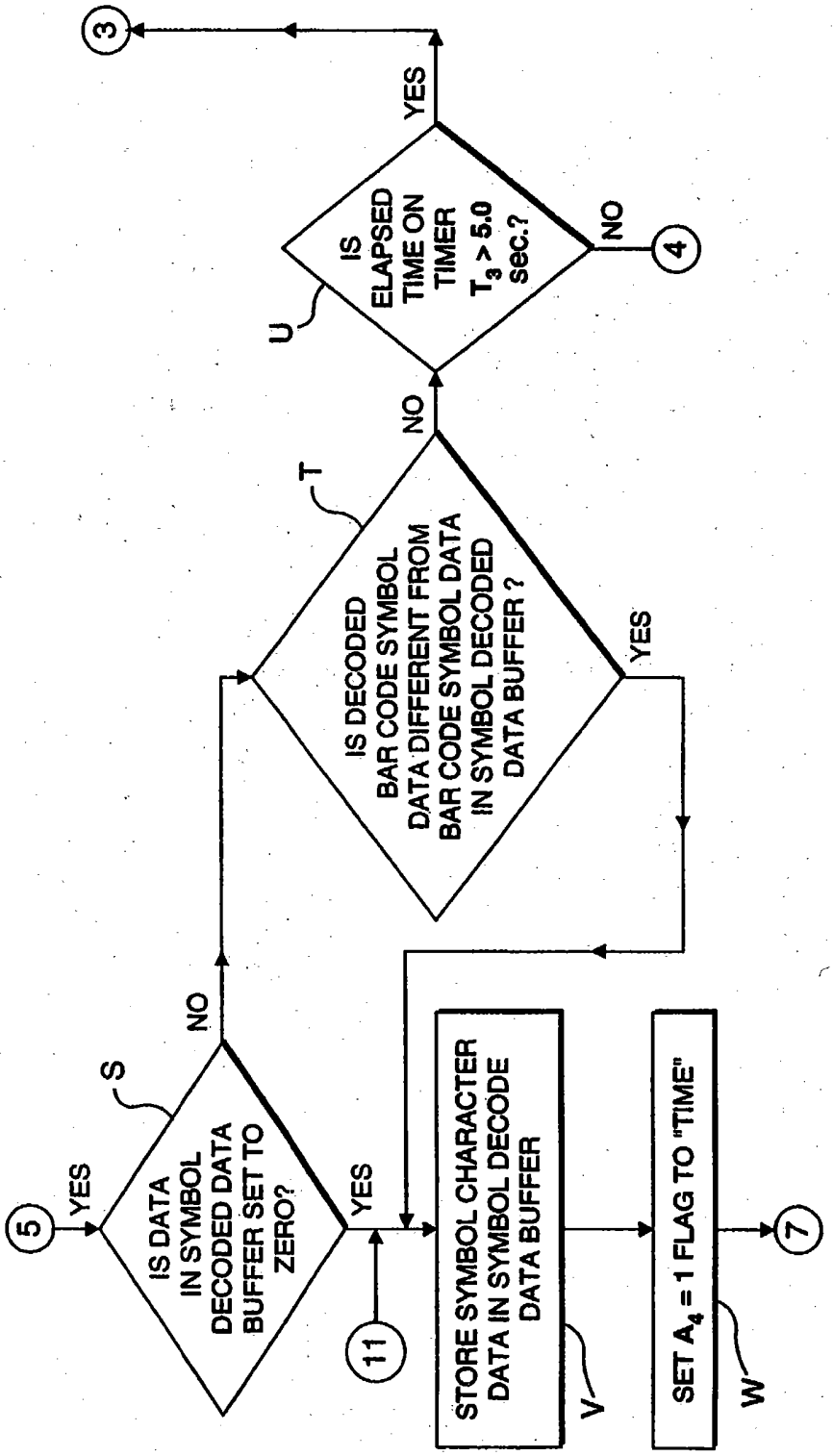

5
YES
IS DATA IN SYMBOL DECODED DATA BUFFER SET TO ZERO?
S
NO
YES
11
STORE SYMBOL CHARACTER DATA IN SYMBOL DECODE DATA BUFFER
V
SET A_4 = 1 FLAG TO "TIME"
W
7
IS DECODED BAR CODE SYMBOL DATA DIFFERENT FROM BAR CODE SYMBOL DATA IN SYMBOL DECODED DATA BUFFER ?
T
YES
NO
IS ELAPSED TIME ON TIMER $T_3 > 5.0$ sec.?
U
YES
NO
3
4

FIG. 30C

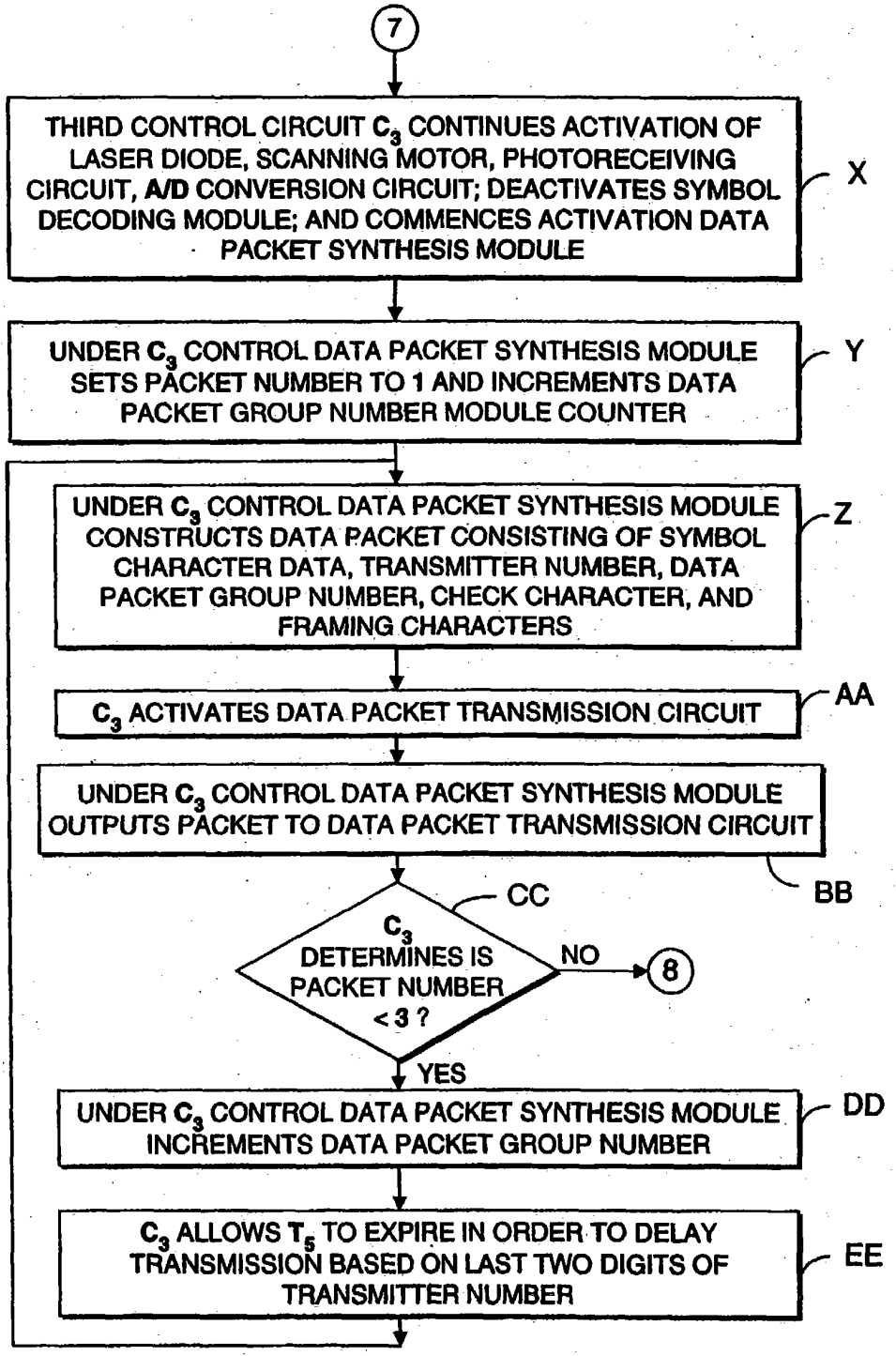

7
THIRD CONTROL CIRCUIT C_3 CONTINUES ACTIVATION OF LASER DIODE, SCANNING MOTOR, PHOTORECEIVING CIRCUIT, A/D CONVERSION CIRCUIT; DEACTIVATES SYMBOL DECODING MODULE; AND COMMENCES ACTIVATION DATA PACKET SYNTHESIS MODULE
X
UNDER C_3 CONTROL DATA PACKET SYNTHESIS MODULE SETS PACKET NUMBER TO 1 AND INCREMENTS DATA PACKET GROUP NUMBER MODULE COUNTER
Y
UNDER C_3 CONTROL DATA PACKET SYNTHESIS MODULE CONSTRUCTS DATA PACKET CONSISTING OF SYMBOL CHARACTER DATA, TRANSMITTER NUMBER, DATA PACKET GROUP NUMBER, CHECK CHARACTER, AND FRAMING CHARACTERS
Z
C_3 ACTIVATES DATA PACKET TRANSMISSION CIRCUIT
AA
UNDER C_3 CONTROL DATA PACKET SYNTHESIS MODULE OUTPUTS PACKET TO DATA PACKET TRANSMISSION CIRCUIT
BB
CC
C_3 DETERMINES IS PACKET NUMBER < 3 ?
NO
8
YES
UNDER C_3 CONTROL DATA PACKET SYNTHESIS MODULE INCREMENTS DATA PACKET GROUP NUMBER
DD
C_3 ALLOWS T_5 TO EXPIRE IN ORDER TO DELAY TRANSMISSION BASED ON LAST TWO DIGITS OF TRANSMITTER NUMBER
EE

FIG. 30D

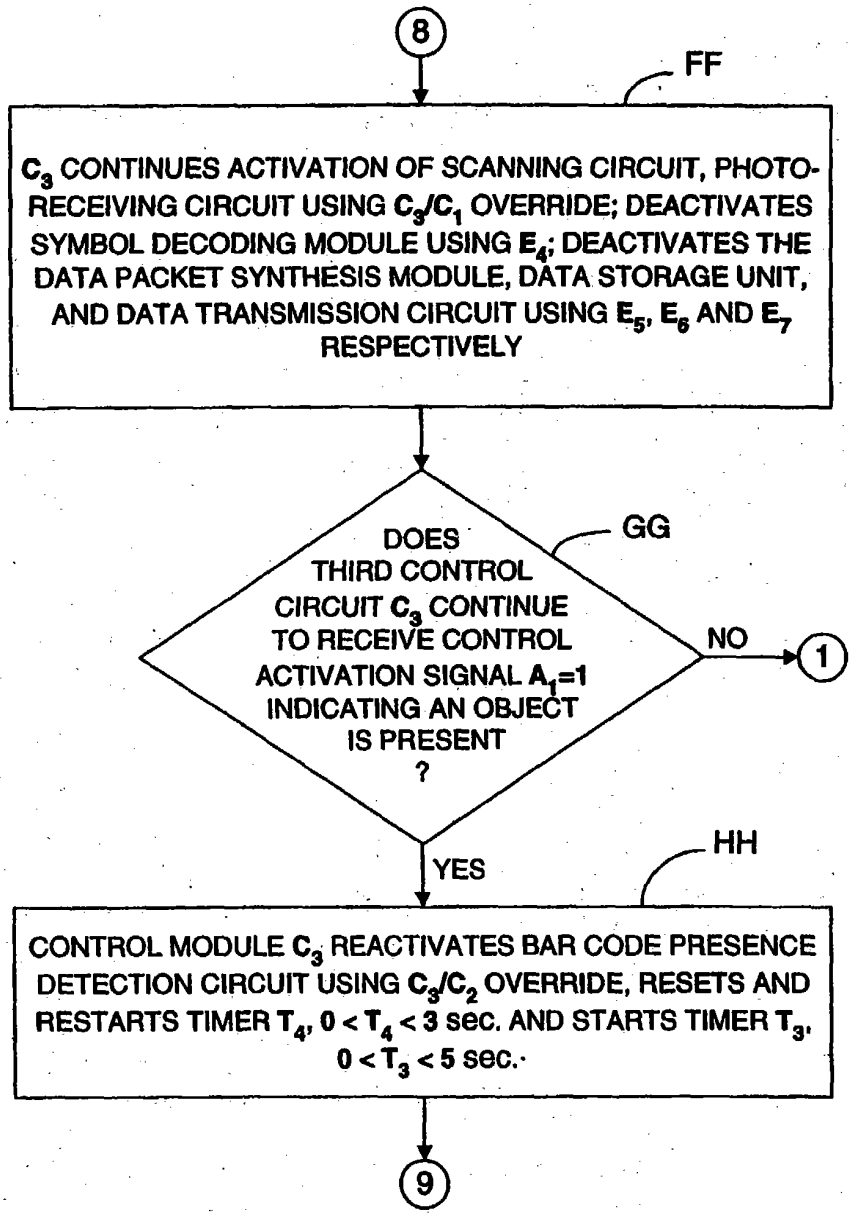

8
FF
C3 CONTINUES ACTIVATION OF SCANNING CIRCUIT, PHOTO-RECEIVING CIRCUIT USING C3/C1 OVERRIDE; DEACTIVATES SYMBOL DECODING MODULE USING E4; DEACTIVATES THE DATA PACKET SYNTHESIS MODULE, DATA STORAGE UNIT, AND DATA TRANSMISSION CIRCUIT USING E5, E6 AND E7 RESPECTIVELY
GG
DOES THIRD CONTROL CIRCUIT C3 CONTINUE TO RECEIVE CONTROL ACTIVATION SIGNAL A1=1 INDICATING AN OBJECT IS PRESENT ?
NO
1
YES
HH
CONTROL MODULE C3 REACTIVATES BAR CODE PRESENCE DETECTION CIRCUIT USING C3/C2 OVERRIDE, RESETS AND RESTARTS TIMER T4, 0 < T4 < 3 sec. AND STARTS TIMER T3, 0 < T3 < 5 sec.
9

FIG. 30E

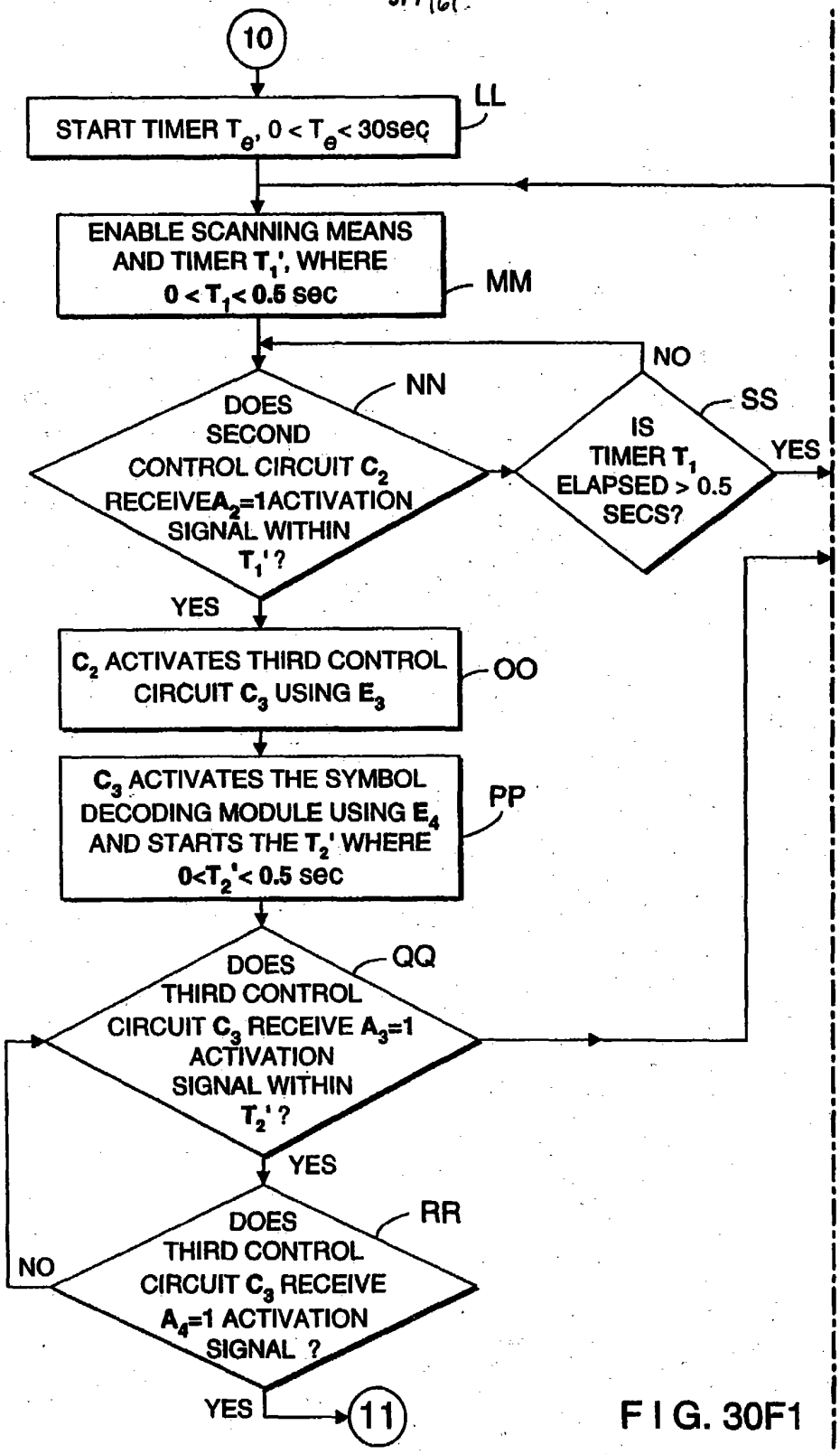

10
START TIMER T_θ, $0 < T_\theta < 30$sec
LL
ENABLE SCANNING MEANS AND TIMER T_1', WHERE $0 < T_1 < 0.5$ sec
MM
DOES SECOND CONTROL CIRCUIT C_2 RECEIVE $A_2=1$ ACTIVATION SIGNAL WITHIN T_1'?
NN
NO
IS TIMER T_1 ELAPSED > 0.5 SECS?
SS
YES
YES
C_2 ACTIVATES THIRD CONTROL CIRCUIT C_3 USING E_3
OO
C_3 ACTIVATES THE SYMBOL DECODING MODULE USING E_4 AND STARTS THE T_2' WHERE $0 < T_2' < 0.5$ sec
PP
DOES THIRD CONTROL CIRCUIT C_3 RECEIVE $A_3=1$ ACTIVATION SIGNAL WITHIN T_2'?
QQ
YES
DOES THIRD CONTROL CIRCUIT C_3 RECEIVE $A_4=1$ ACTIVATION SIGNAL ?
RR
NO
YES
11

FIG. 30F1

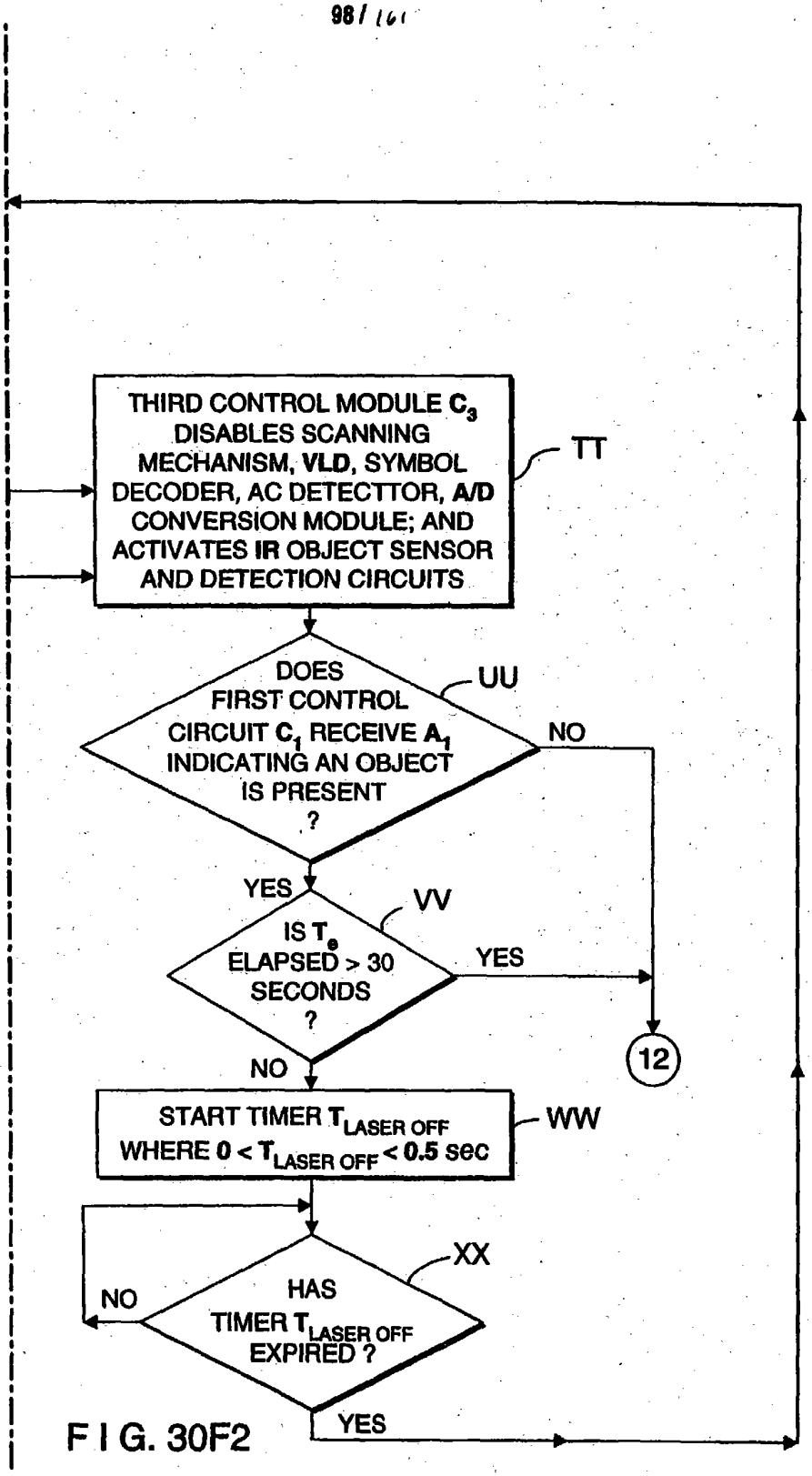

THIRD CONTROL MODULE C_3 DISABLES SCANNING MECHANISM, VLD, SYMBOL DECODER, AC DETECTTOR, A/D CONVERSION MODULE; AND ACTIVATES IR OBJECT SENSOR AND DETECTION CIRCUITS
TT
DOES FIRST CONTROL CIRCUIT C_1 RECEIVE A_1 INDICATING AN OBJECT IS PRESENT ?
UU
NO
YES
IS T_e ELAPSED > 30 SECONDS ?
VV
YES
12
NO
START TIMER $T_{LASER\ OFF}$ WHERE $0 < T_{LASER\ OFF} < 0.5$ sec
WW
HAS TIMER $T_{LASER\ OFF}$ EXPIRED ?
XX
NO
YES

FIG. 30F2

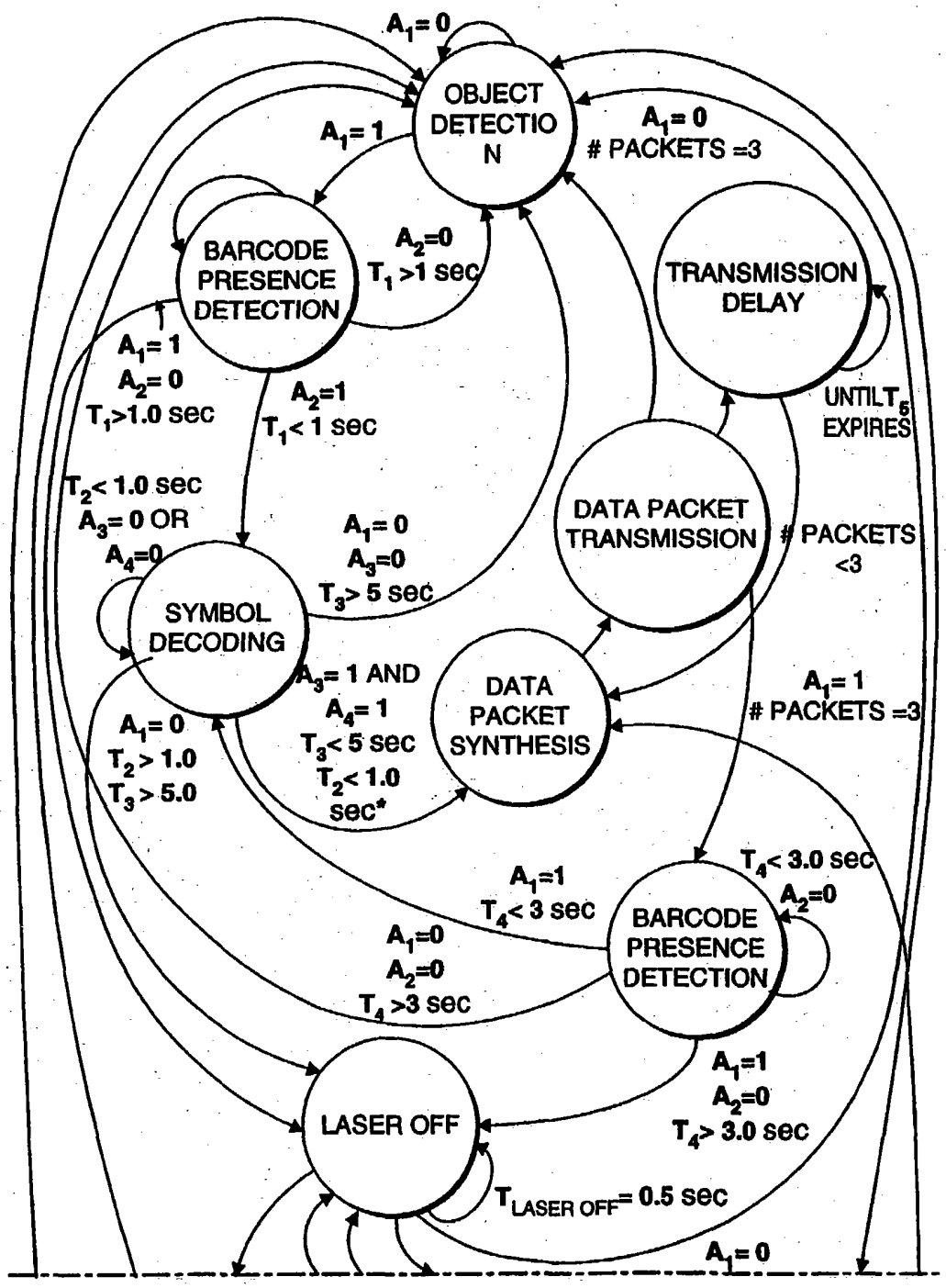

$A_1 = 0$
OBJECT DETECTION
$A_1 = 1$
$A_1 = 0$
PACKETS =3
BARCODE PRESENCE DETECTION
$A_2 = 0$
$T_1 > 1$ sec
TRANSMISSION DELAY
$A_1 = 1$
$A_2 = 0$
$T_1 > 1.0$ sec
$A_2 = 1$
$T_1 < 1$ sec
UNTIL T_5 EXPIRES
$T_2 < 1.0$ sec
$A_3 = 0$ OR
$A_4 = 0$
DATA PACKET TRANSMISSION
PACKETS <3
$A_1 = 0$
$A_3 = 0$
$T_3 > 5$ sec
SYMBOL DECODING
$A_3 = 1$ AND
$A_4 = 1$
$T_3 < 5$ sec
$T_2 < 1.0$ sec*
DATA PACKET SYNTHESIS
$A_1 = 1$
PACKETS =3
$A_1 = 0$
$T_2 > 1.0$
$T_3 > 5.0$
$T_4 < 3.0$ sec
$A_2 = 0$
$A_1 = 1$
$T_4 < 3$ sec
BARCODE PRESENCE DETECTION
$A_1 = 0$
$A_2 = 0$
$T_4 > 3$ sec
$A_1 = 1$
$A_2 = 0$
$T_4 > 3.0$ sec
LASER OFF
$T_{LASER\ OFF} = 0.5$ sec
$A_1 = 0$

FIG. 31A

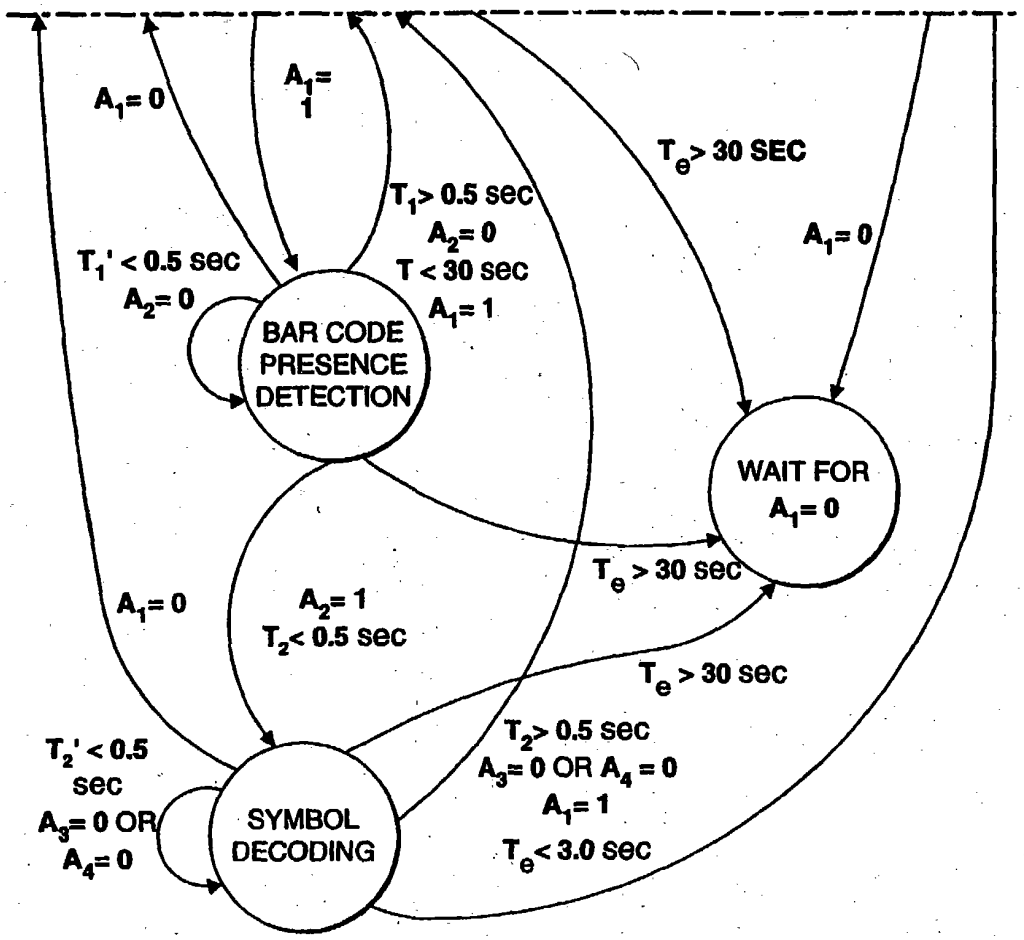

$A_1 = 0$
$A_1 = 1$
$T_e > 30$ SEC
$T_1 > 0.5$ sec
$A_2 = 0$
$T < 30$ sec
$A_1 = 1$
$T_1' < 0.5$ sec
$A_2 = 0$
$A_1 = 0$
BAR CODE PRESENCE DETECTION
WAIT FOR $A_1 = 0$
$T_e > 30$ sec
$A_1 = 0$
$A_2 = 1$
$T_2 < 0.5$ sec
$T_e > 30$ sec
$T_2' < 0.5$ sec
$A_3 = 0$ OR $A_4 = 0$
SYMBOL DECODING
$T_2 > 0.5$ sec
$A_3 = 0$ OR $A_4 = 0$
$A_1 = 1$
$T_e < 3.0$ sec
$A_3 = 1, A_4 = 1$
$T_2' < 0.5$ sec
*: SYMBOL CHARACTER DATA IS DIFFERENT THAN DATA ELEMENT IN DECODED SYMBOL DATA BUFFER

FIG. 31B

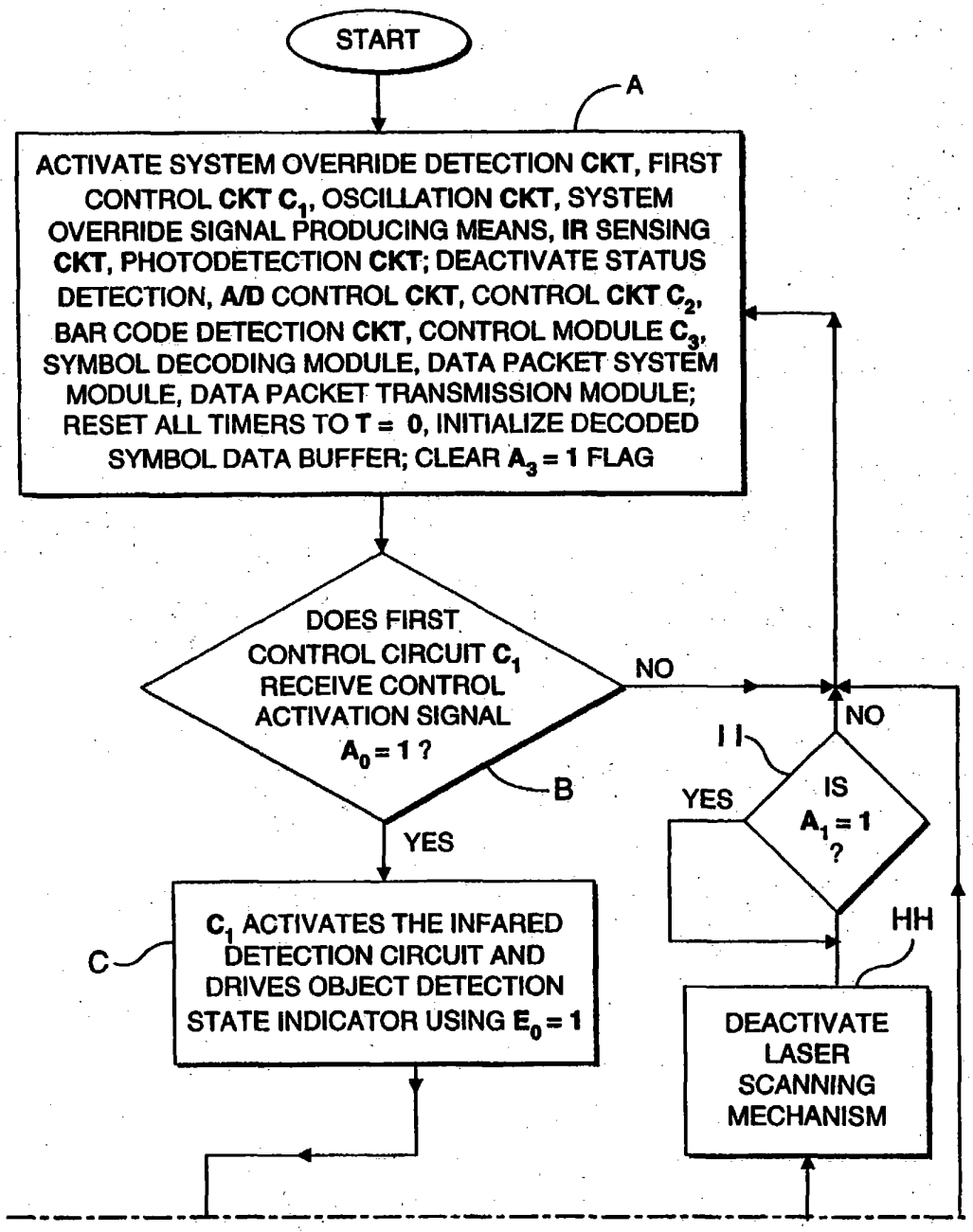

START
A
ACTIVATE SYSTEM OVERRIDE DETECTION CKT, FIRST CONTROL CKT C_1, OSCILLATION CKT, SYSTEM OVERRIDE SIGNAL PRODUCING MEANS, IR SENSING CKT, PHOTODETECTION CKT; DEACTIVATE STATUS DETECTION, A/D CONTROL CKT, CONTROL CKT C_2, BAR CODE DETECTION CKT, CONTROL MODULE C_3, SYMBOL DECODING MODULE, DATA PACKET SYSTEM MODULE, DATA PACKET TRANSMISSION MODULE; RESET ALL TIMERS TO T = 0, INITIALIZE DECODED SYMBOL DATA BUFFER; CLEAR $A_3 = 1$ FLAG
DOES FIRST CONTROL CIRCUIT C_1 RECEIVE CONTROL ACTIVATION SIGNAL $A_0 = 1$?
NO
B
YES
C
C_1 ACTIVATES THE INFARED DETECTION CIRCUIT AND DRIVES OBJECT DETECTION STATE INDICATOR USING $E_0 = 1$
II
NO
IS $A_1 = 1$?
YES
HH
DEACTIVATE LASER SCANNING MECHANISM

FIG. 32A1

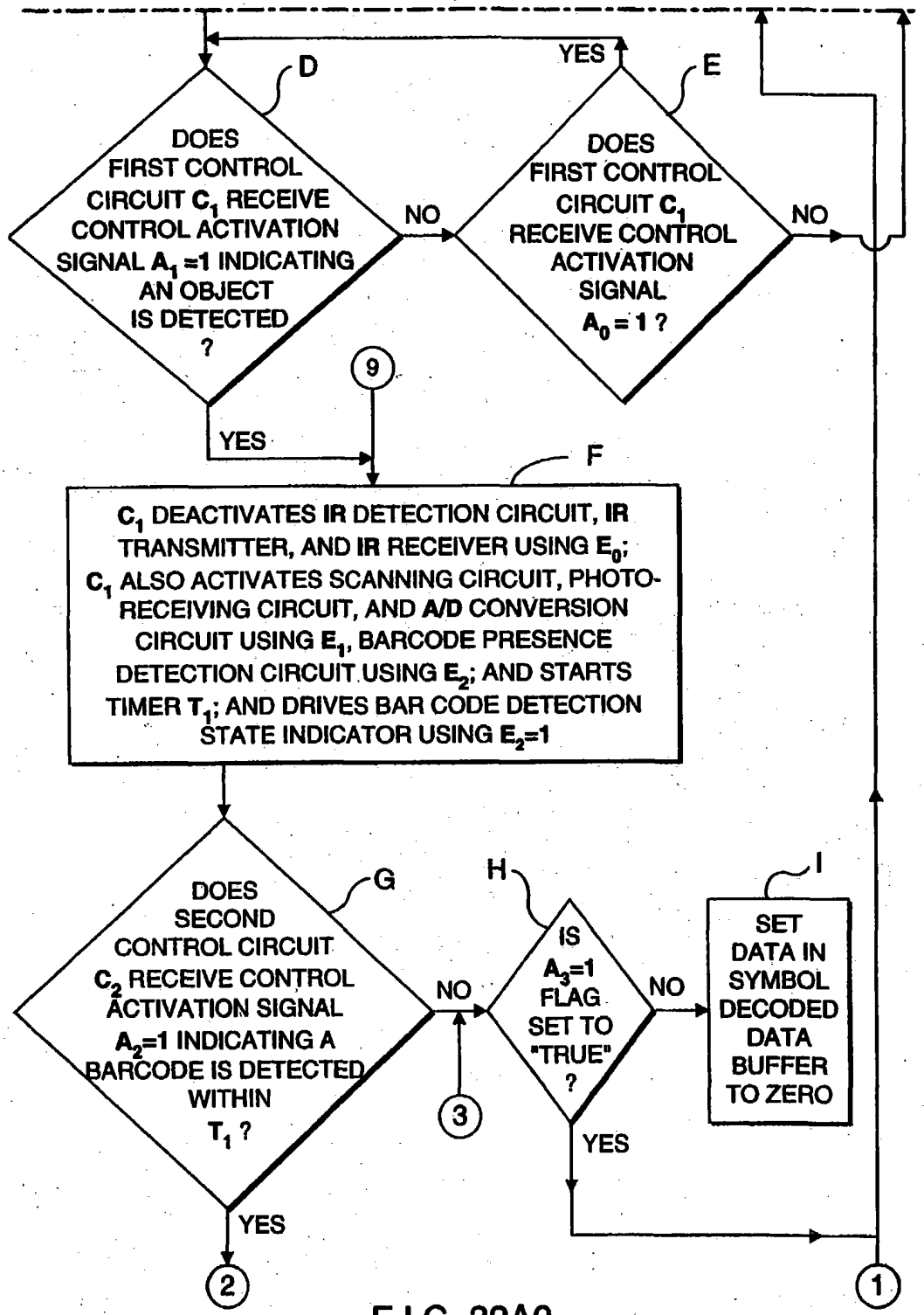

D
DOES FIRST CONTROL CIRCUIT C_1 RECEIVE CONTROL ACTIVATION SIGNAL A_1 =1 INDICATING AN OBJECT IS DETECTED ?
NO
YES
E
DOES FIRST CONTROL CIRCUIT C_1 RECEIVE CONTROL ACTIVATION SIGNAL A_0 = 1 ?
NO
9
YES
F
C_1 DEACTIVATES IR DETECTION CIRCUIT, IR TRANSMITTER, AND IR RECEIVER USING E_0; C_1 ALSO ACTIVATES SCANNING CIRCUIT, PHOTO-RECEIVING CIRCUIT, AND A/D CONVERSION CIRCUIT USING E_1, BARCODE PRESENCE DETECTION CIRCUIT USING E_2; AND STARTS TIMER T_1; AND DRIVES BAR CODE DETECTION STATE INDICATOR USING E_2=1
G
DOES SECOND CONTROL CIRCUIT C_2 RECEIVE CONTROL ACTIVATION SIGNAL A_2=1 INDICATING A BARCODE IS DETECTED WITHIN T_1 ?
NO
H
IS A_3=1 FLAG SET TO "TRUE" ?
NO
I
SET DATA IN SYMBOL DECODED DATA BUFFER TO ZERO
YES
YES
3
2
1

FIG. 32A2

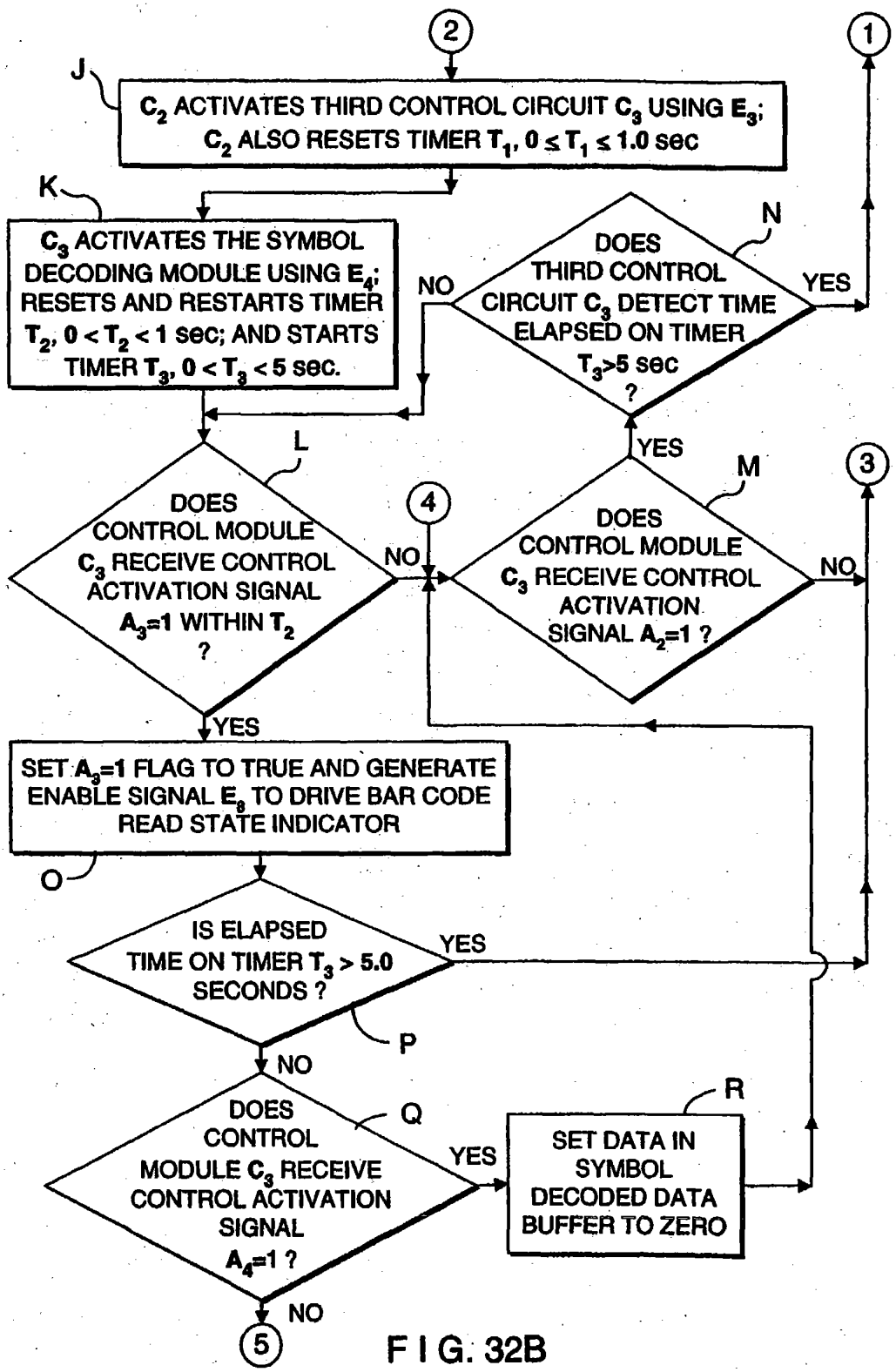

2
1
J
C_2 ACTIVATES THIRD CONTROL CIRCUIT C_3 USING E_3; C_2 ALSO RESETS TIMER T_1, $0 \leq T_1 \leq 1.0$ sec
K
C_3 ACTIVATES THE SYMBOL DECODING MODULE USING E_4; RESETS AND RESTARTS TIMER T_2, $0 < T_2 < 1$ sec; AND STARTS TIMER T_3, $0 < T_3 < 5$ sec.
N
DOES THIRD CONTROL CIRCUIT C_3 DETECT TIME ELAPSED ON TIMER T_3>5 sec ?
NO
YES
YES
L
DOES CONTROL MODULE C_3 RECEIVE CONTROL ACTIVATION SIGNAL A_3=1 WITHIN T_2 ?
4
M
DOES CONTROL MODULE C_3 RECEIVE CONTROL ACTIVATION SIGNAL A_2=1 ?
3
NO
NO
YES
SET A_3=1 FLAG TO TRUE AND GENERATE ENABLE SIGNAL E_8 TO DRIVE BAR CODE READ STATE INDICATOR
O
IS ELAPSED TIME ON TIMER T_3 > 5.0 SECONDS ?
YES
P
NO
DOES CONTROL MODULE C_3 RECEIVE CONTROL ACTIVATION SIGNAL A_4=1 ?
Q
YES
R
SET DATA IN SYMBOL DECODED DATA BUFFER TO ZERO
NO
5

FIG. 32B

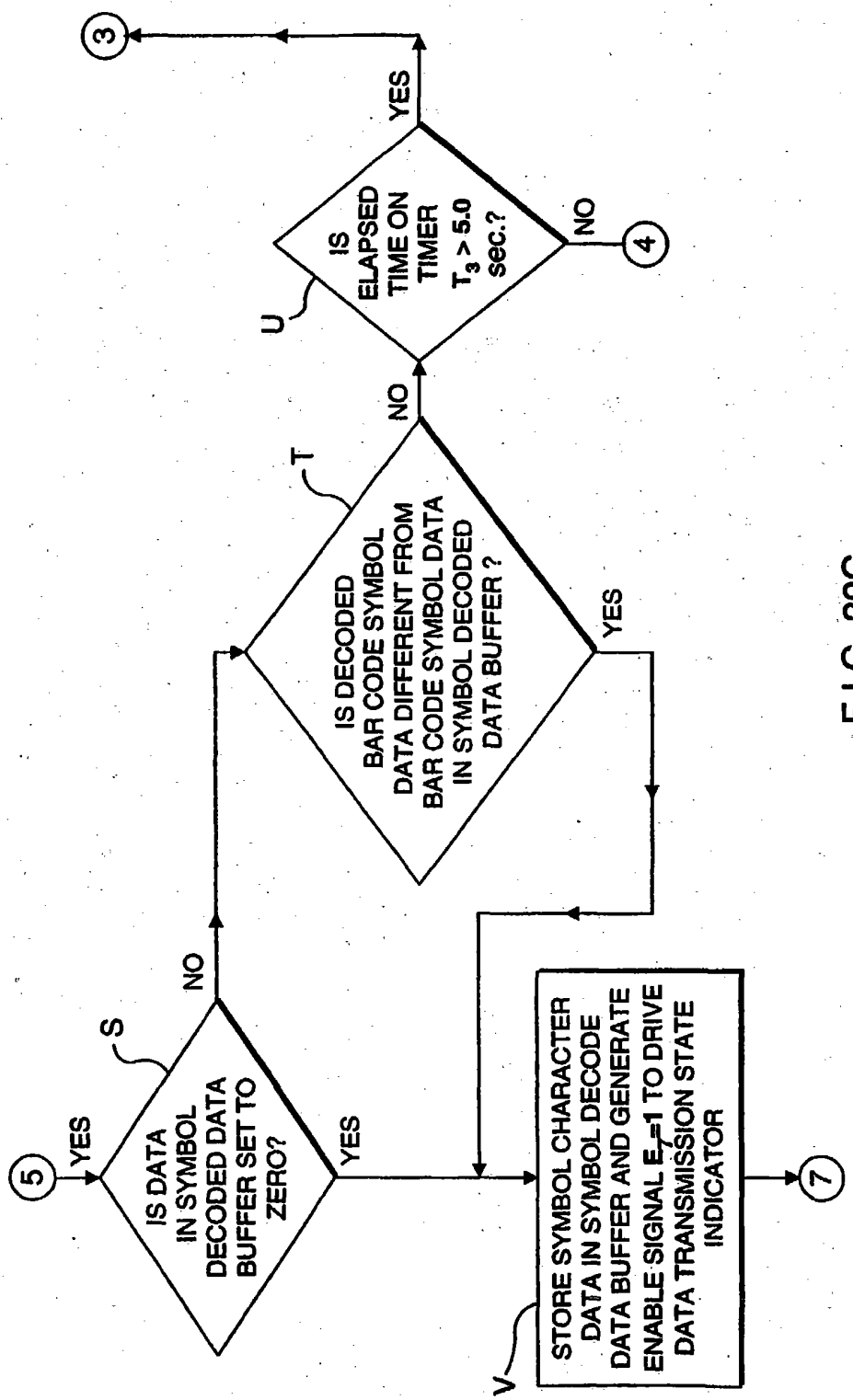

5
YES
IS DATA IN SYMBOL DECODED DATA BUFFER SET TO ZERO?
S
NO
YES
IS DECODED BAR CODE SYMBOL DATA DIFFERENT FROM BAR CODE SYMBOL DATA IN SYMBOL DECODED DATA BUFFER ?
T
NO
YES
IS ELAPSED TIME ON TIMER $T_3 > 5.0$ sec.?
U
YES
NO
3
4
STORE SYMBOL CHARACTER DATA IN SYMBOL DECODE DATA BUFFER AND GENERATE ENABLE SIGNAL E_T=1 TO DRIVE DATA TRANSMISSION STATE INDICATOR
V
7

FIG. 32C

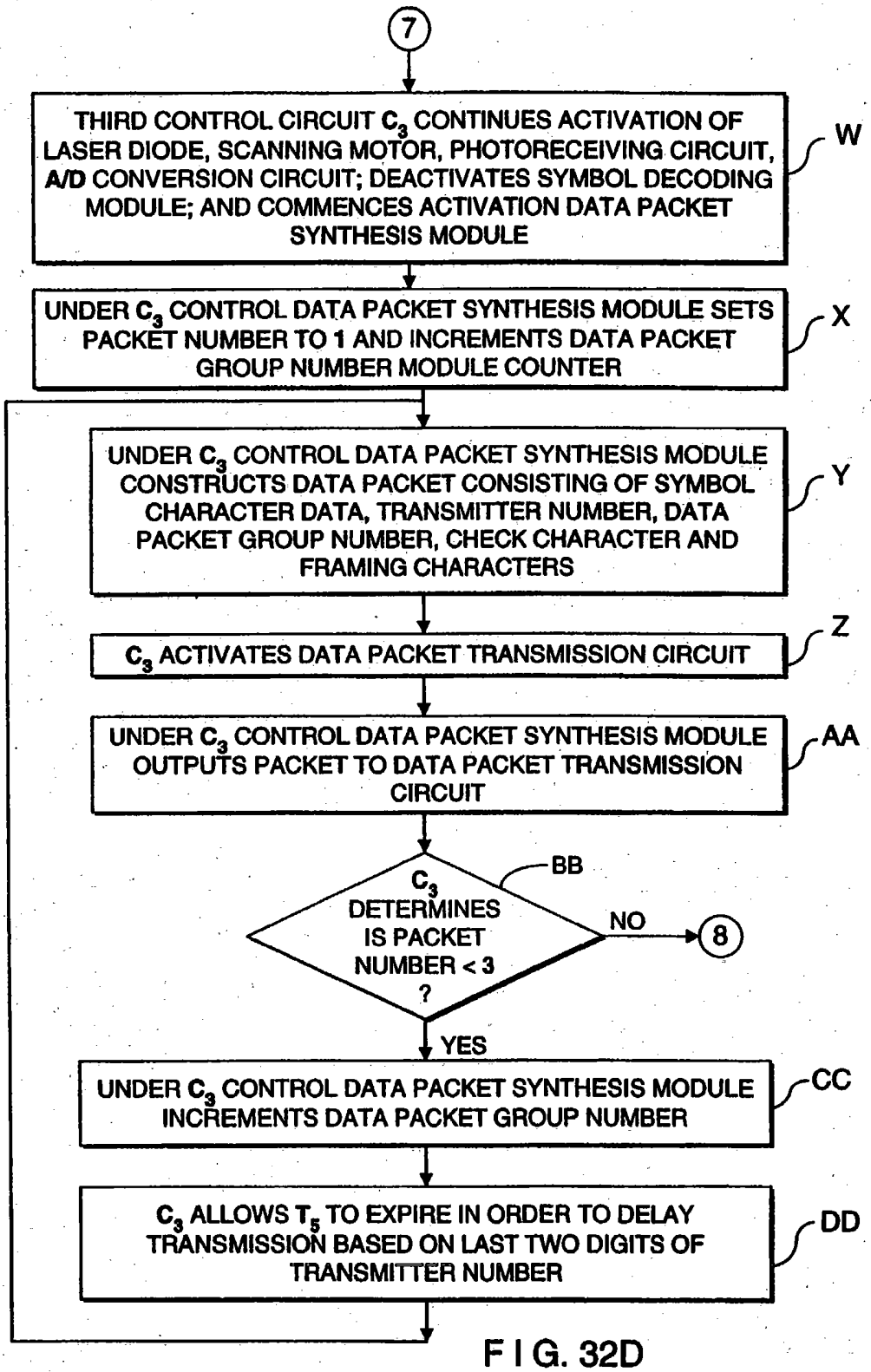

7
THIRD CONTROL CIRCUIT C_3 CONTINUES ACTIVATION OF LASER DIODE, SCANNING MOTOR, PHOTORECEIVING CIRCUIT, A/D CONVERSION CIRCUIT; DEACTIVATES SYMBOL DECODING MODULE; AND COMMENCES ACTIVATION DATA PACKET SYNTHESIS MODULE
W
UNDER C_3 CONTROL DATA PACKET SYNTHESIS MODULE SETS PACKET NUMBER TO 1 AND INCREMENTS DATA PACKET GROUP NUMBER MODULE COUNTER
X
UNDER C_3 CONTROL DATA PACKET SYNTHESIS MODULE CONSTRUCTS DATA PACKET CONSISTING OF SYMBOL CHARACTER DATA, TRANSMITTER NUMBER, DATA PACKET GROUP NUMBER, CHECK CHARACTER AND FRAMING CHARACTERS
Y
C_3 ACTIVATES DATA PACKET TRANSMISSION CIRCUIT
Z
UNDER C_3 CONTROL DATA PACKET SYNTHESIS MODULE OUTPUTS PACKET TO DATA PACKET TRANSMISSION CIRCUIT
AA
C_3 DETERMINES IS PACKET NUMBER < 3 ?
BB
NO
8
YES
UNDER C_3 CONTROL DATA PACKET SYNTHESIS MODULE INCREMENTS DATA PACKET GROUP NUMBER
CC
C_3 ALLOWS T_5 TO EXPIRE IN ORDER TO DELAY TRANSMISSION BASED ON LAST TWO DIGITS OF TRANSMITTER NUMBER
DD

FIG. 32D

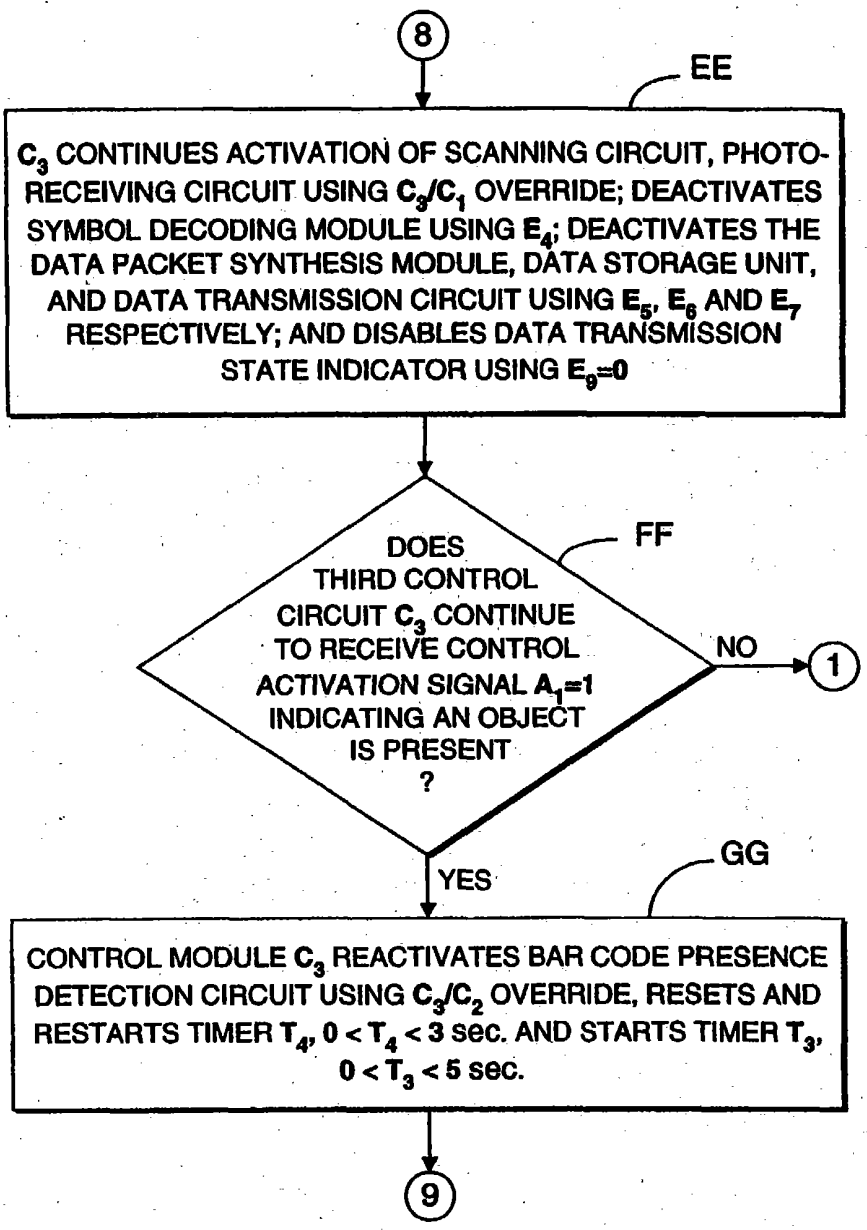

8
EE
C_3 CONTINUES ACTIVATION OF SCANNING CIRCUIT, PHOTO-RECEIVING CIRCUIT USING C_3/C_1 OVERRIDE; DEACTIVATES SYMBOL DECODING MODULE USING E_4; DEACTIVATES THE DATA PACKET SYNTHESIS MODULE, DATA STORAGE UNIT, AND DATA TRANSMISSION CIRCUIT USING E_5, E_6 AND E_7 RESPECTIVELY; AND DISABLES DATA TRANSMISSION STATE INDICATOR USING E_9=0
FF
DOES THIRD CONTROL CIRCUIT C_3 CONTINUE TO RECEIVE CONTROL ACTIVATION SIGNAL A_1=1 INDICATING AN OBJECT IS PRESENT ?
NO
1
YES
GG
CONTROL MODULE C_3 REACTIVATES BAR CODE PRESENCE DETECTION CIRCUIT USING C_3/C_2 OVERRIDE, RESETS AND RESTARTS TIMER T_4, $0 < T_4 < 3$ sec. AND STARTS TIMER T_3, $0 < T_3 < 5$ sec.
9

FIG. 32E

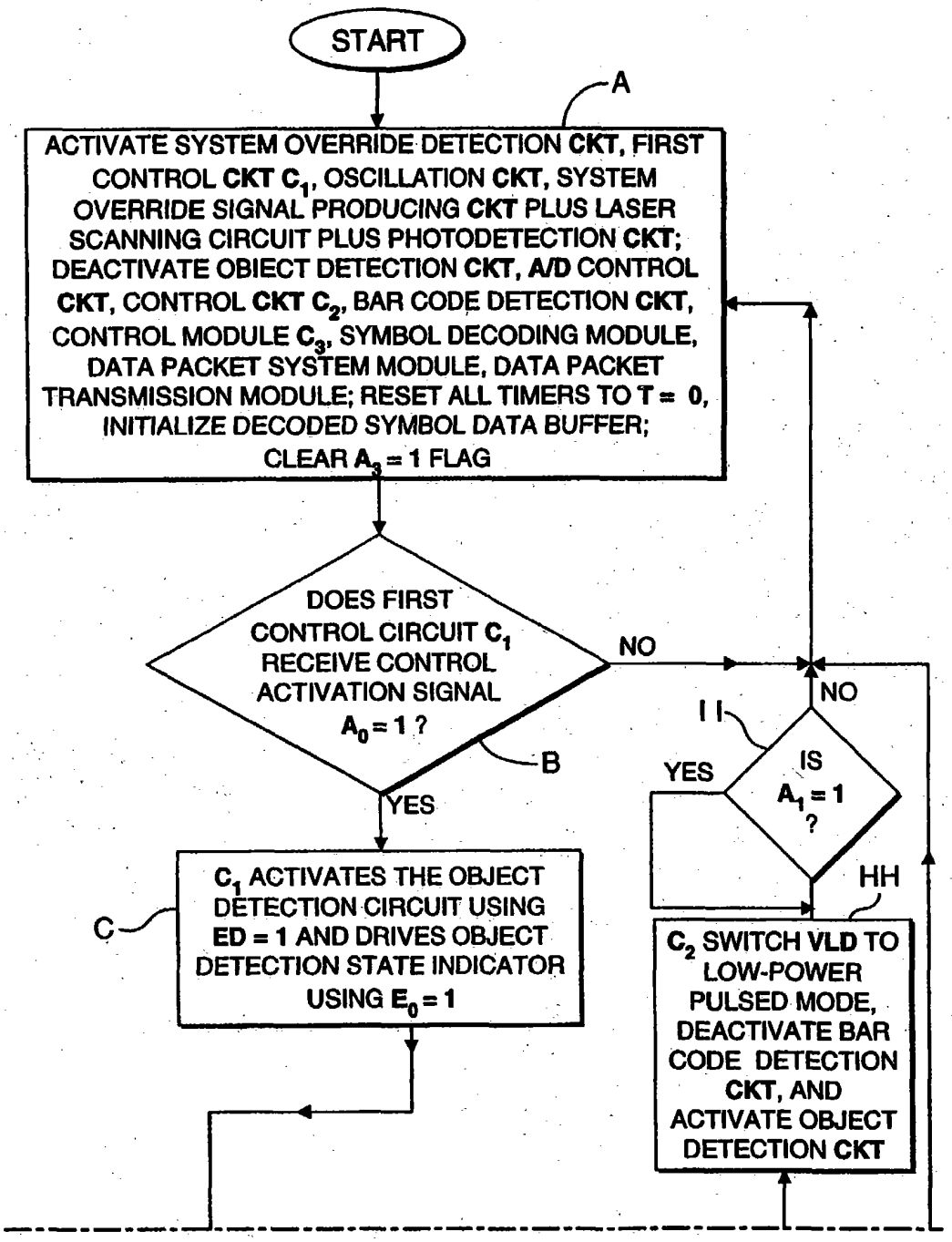

START
A
ACTIVATE SYSTEM OVERRIDE DETECTION CKT, FIRST CONTROL CKT C_1, OSCILLATION CKT, SYSTEM OVERRIDE SIGNAL PRODUCING CKT PLUS LASER SCANNING CIRCUIT PLUS PHOTODETECTION CKT; DEACTIVATE OBIECT DETECTION CKT, A/D CONTROL CKT, CONTROL CKT C_2, BAR CODE DETECTION CKT, CONTROL MODULE C_3, SYMBOL DECODING MODULE, DATA PACKET SYSTEM MODULE, DATA PACKET TRANSMISSION MODULE; RESET ALL TIMERS TO T = 0, INITIALIZE DECODED SYMBOL DATA BUFFER; CLEAR A_3 = 1 FLAG
DOES FIRST CONTROL CIRCUIT C_1 RECEIVE CONTROL ACTIVATION SIGNAL A_0 = 1 ?
NO
B
YES
C
C_1 ACTIVATES THE OBJECT DETECTION CIRCUIT USING ED = 1 AND DRIVES OBJECT DETECTION STATE INDICATOR USING E_0 = 1
II
NO
YES
IS A_1 = 1 ?
HH
C_2 SWITCH VLD TO LOW-POWER PULSED MODE, DEACTIVATE BAR CODE DETECTION CKT, AND ACTIVATE OBJECT DETECTION CKT

FIG. 33A1

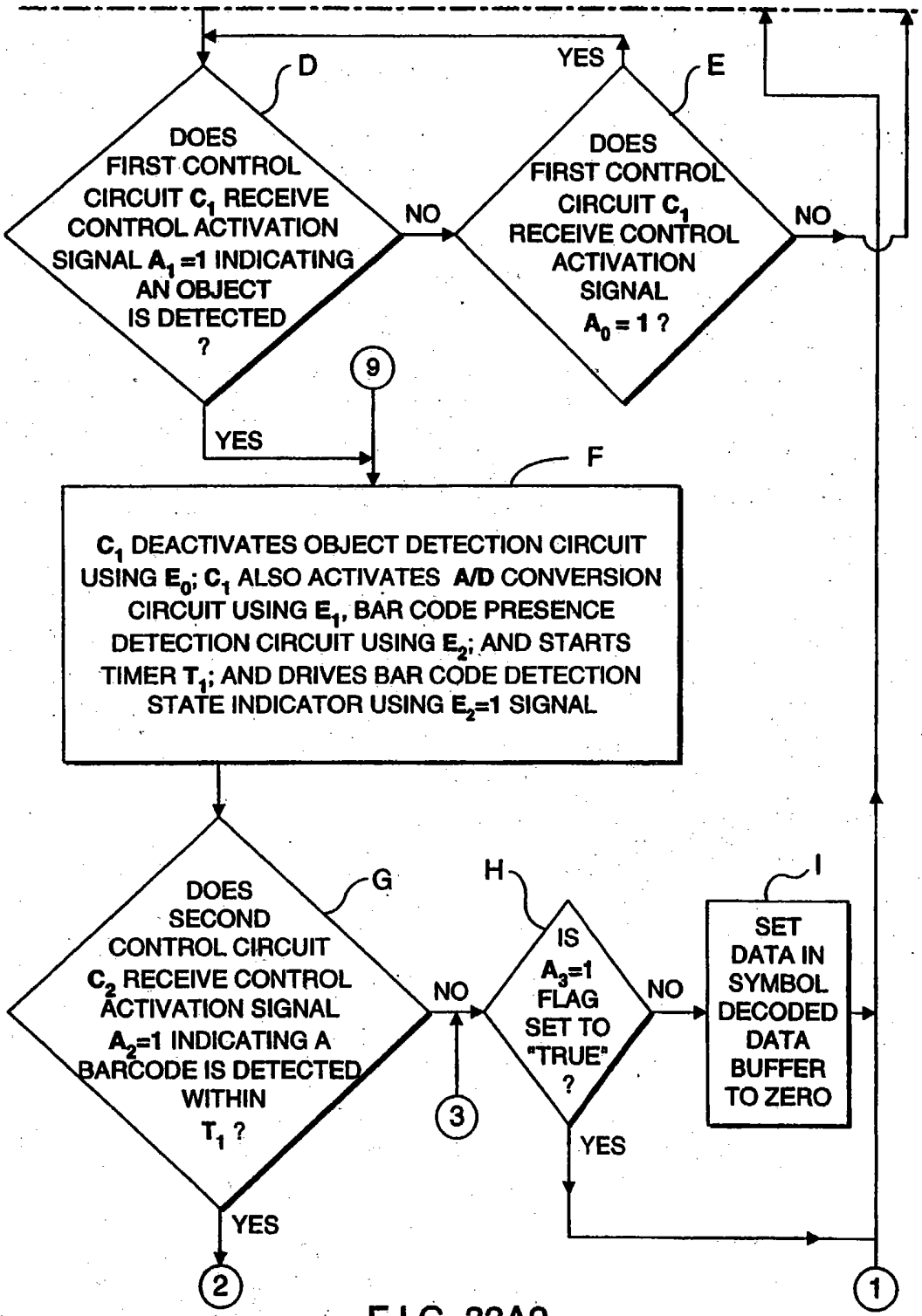

D
DOES FIRST CONTROL CIRCUIT C_1 RECEIVE CONTROL ACTIVATION SIGNAL A_1 =1 INDICATING AN OBJECT IS DETECTED ?
NO
YES
E
DOES FIRST CONTROL CIRCUIT C_1 RECEIVE CONTROL ACTIVATION SIGNAL A_0 = 1 ?
NO
9
YES
F
C_1 DEACTIVATES OBJECT DETECTION CIRCUIT USING E_0; C_1 ALSO ACTIVATES A/D CONVERSION CIRCUIT USING E_1, BAR CODE PRESENCE DETECTION CIRCUIT USING E_2; AND STARTS TIMER T_1; AND DRIVES BAR CODE DETECTION STATE INDICATOR USING E_2=1 SIGNAL
G
DOES SECOND CONTROL CIRCUIT C_2 RECEIVE CONTROL ACTIVATION SIGNAL A_2=1 INDICATING A BARCODE IS DETECTED WITHIN T_1 ?
NO
YES
H
IS A_3=1 FLAG SET TO "TRUE" ?
NO
YES
I
SET DATA IN SYMBOL DECODED DATA BUFFER TO ZERO
3
2
1

FIG. 33A2

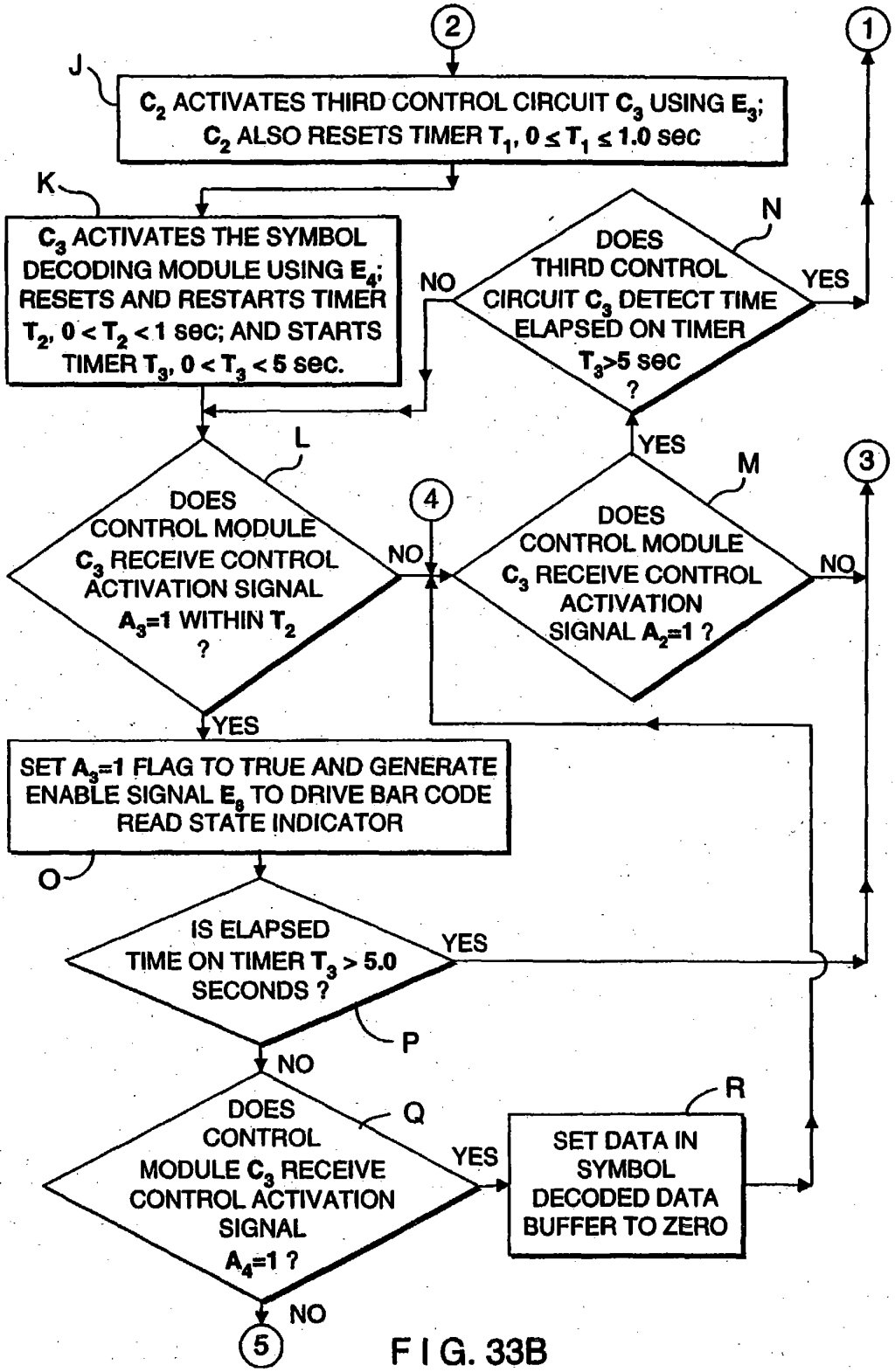

2
1
J
C_2 ACTIVATES THIRD CONTROL CIRCUIT C_3 USING E_3; C_2 ALSO RESETS TIMER T_1, $0 \leq T_1 \leq 1.0$ sec
K
C_3 ACTIVATES THE SYMBOL DECODING MODULE USING E_4; RESETS AND RESTARTS TIMER T_2, $0 < T_2 < 1$ sec; AND STARTS TIMER T_3, $0 < T_3 < 5$ sec.
N
DOES THIRD CONTROL CIRCUIT C_3 DETECT TIME ELAPSED ON TIMER T_3>5 sec ?
NO
YES
L
DOES CONTROL MODULE C_3 RECEIVE CONTROL ACTIVATION SIGNAL A_3=1 WITHIN T_2 ?
NO
4
M
DOES CONTROL MODULE C_3 RECEIVE CONTROL ACTIVATION SIGNAL A_2=1 ?
NO
YES
3
YES
SET A_3=1 FLAG TO TRUE AND GENERATE ENABLE SIGNAL E_8 TO DRIVE BAR CODE READ STATE INDICATOR
O
IS ELAPSED TIME ON TIMER T_3 > 5.0 SECONDS ?
YES
P
NO
DOES CONTROL MODULE C_3 RECEIVE CONTROL ACTIVATION SIGNAL A_4=1 ?
Q
YES
R
SET DATA IN SYMBOL DECODED DATA BUFFER TO ZERO
NO
5

FIG. 33B

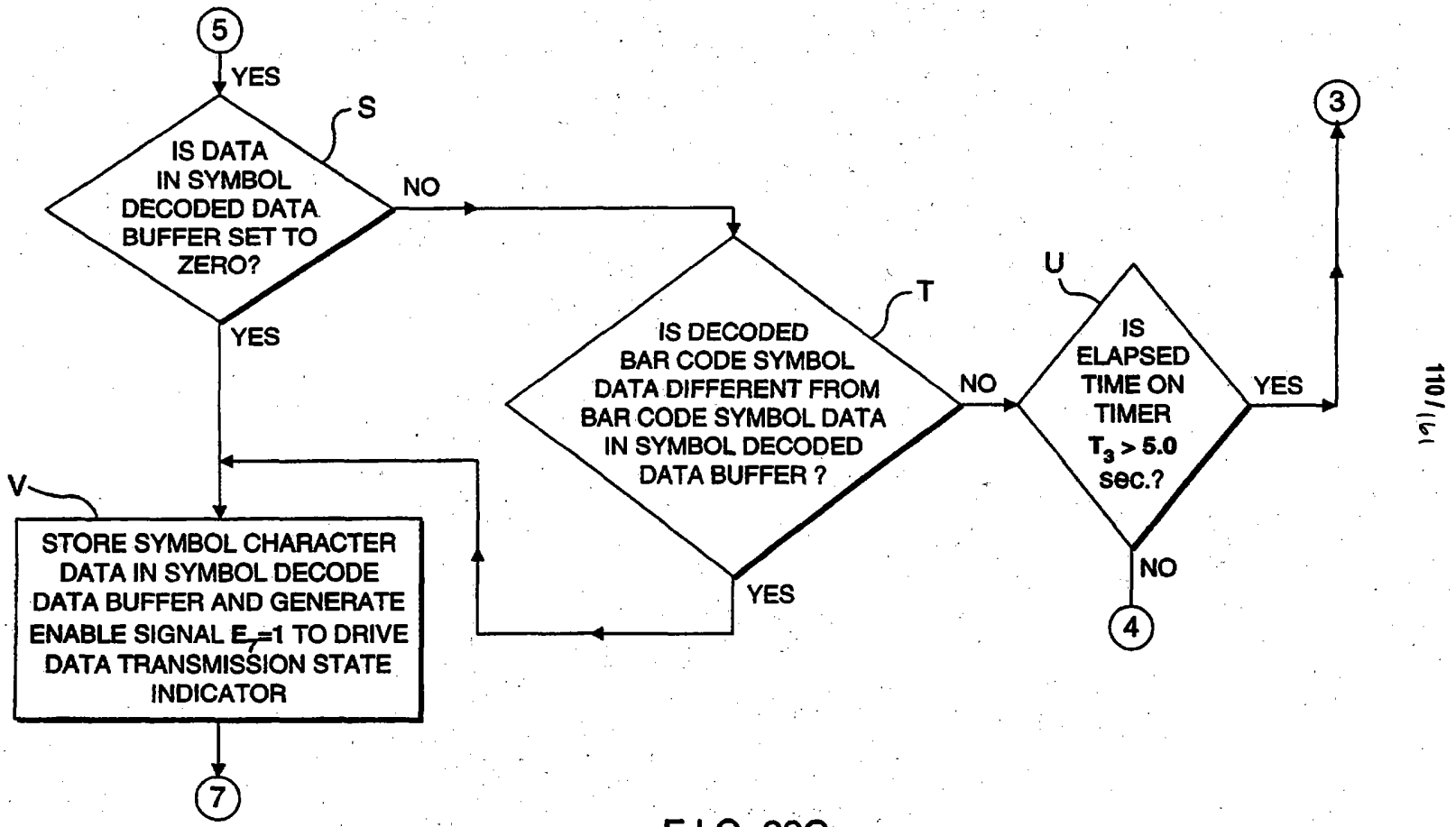

5
YES
S
IS DATA IN SYMBOL DECODED DATA BUFFER SET TO ZERO?
NO
YES
T
IS DECODED BAR CODE SYMBOL DATA DIFFERENT FROM BAR CODE SYMBOL DATA IN SYMBOL DECODED DATA BUFFER ?
NO
U
IS ELAPSED TIME ON TIMER $T_3 > 5.0$ sec.?
YES
3
NO
4
YES
V
STORE SYMBOL CHARACTER DATA IN SYMBOL DECODE DATA BUFFER AND GENERATE ENABLE SIGNAL E_7=1 TO DRIVE DATA TRANSMISSION STATE INDICATOR
7
110/(6)

FIG. 33C

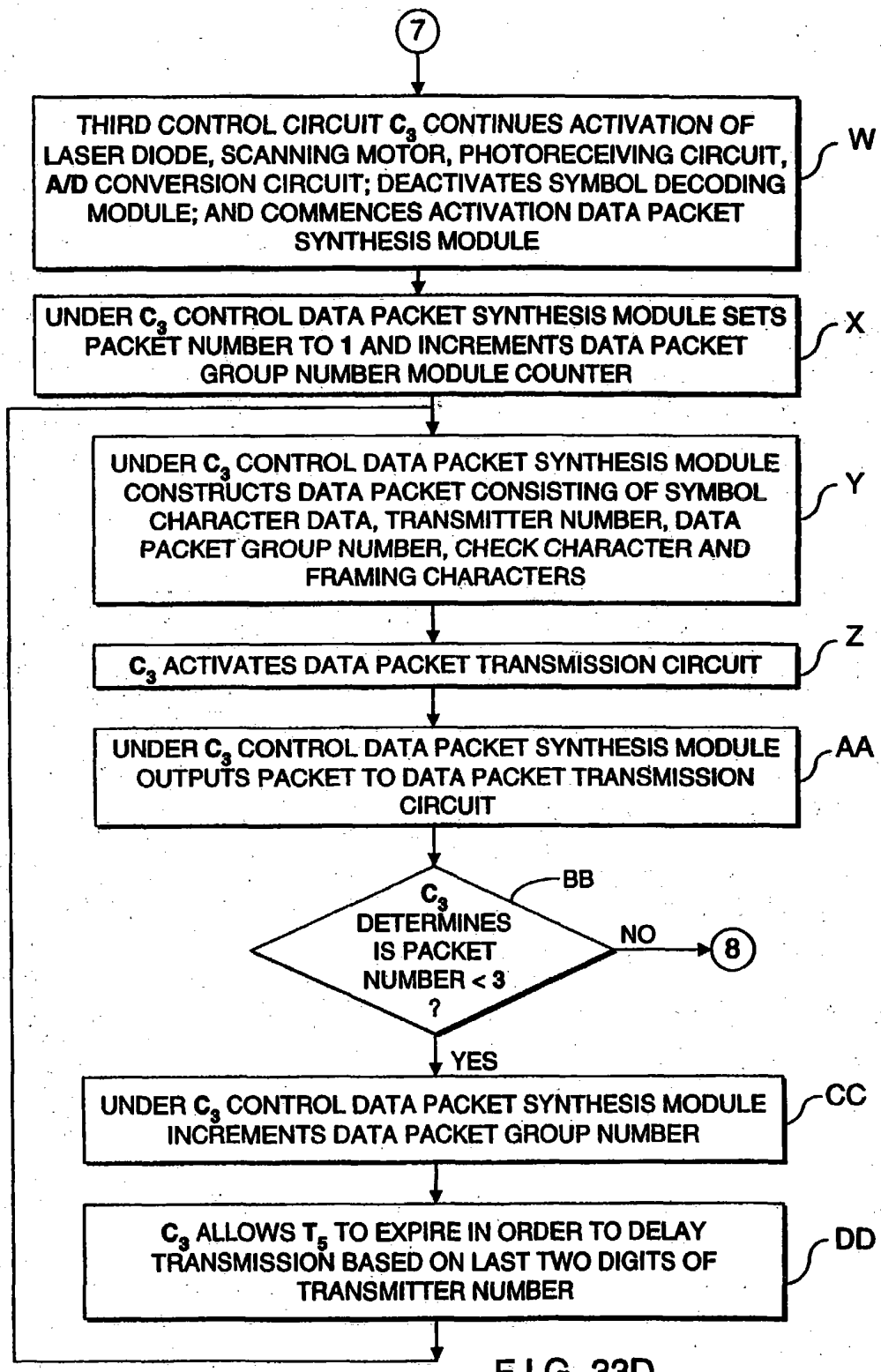

7
THIRD CONTROL CIRCUIT C3 CONTINUES ACTIVATION OF LASER DIODE, SCANNING MOTOR, PHOTORECEIVING CIRCUIT, A/D CONVERSION CIRCUIT; DEACTIVATES SYMBOL DECODING MODULE; AND COMMENCES ACTIVATION DATA PACKET SYNTHESIS MODULE
W
UNDER C3 CONTROL DATA PACKET SYNTHESIS MODULE SETS PACKET NUMBER TO 1 AND INCREMENTS DATA PACKET GROUP NUMBER MODULE COUNTER
X
UNDER C3 CONTROL DATA PACKET SYNTHESIS MODULE CONSTRUCTS DATA PACKET CONSISTING OF SYMBOL CHARACTER DATA, TRANSMITTER NUMBER, DATA PACKET GROUP NUMBER, CHECK CHARACTER AND FRAMING CHARACTERS
Y
C3 ACTIVATES DATA PACKET TRANSMISSION CIRCUIT
Z
UNDER C3 CONTROL DATA PACKET SYNTHESIS MODULE OUTPUTS PACKET TO DATA PACKET TRANSMISSION CIRCUIT
AA
C3 DETERMINES IS PACKET NUMBER < 3 ?
BB
NO
8
YES
UNDER C3 CONTROL DATA PACKET SYNTHESIS MODULE INCREMENTS DATA PACKET GROUP NUMBER
CC
C3 ALLOWS T5 TO EXPIRE IN ORDER TO DELAY TRANSMISSION BASED ON LAST TWO DIGITS OF TRANSMITTER NUMBER
DD

FIG. 33D

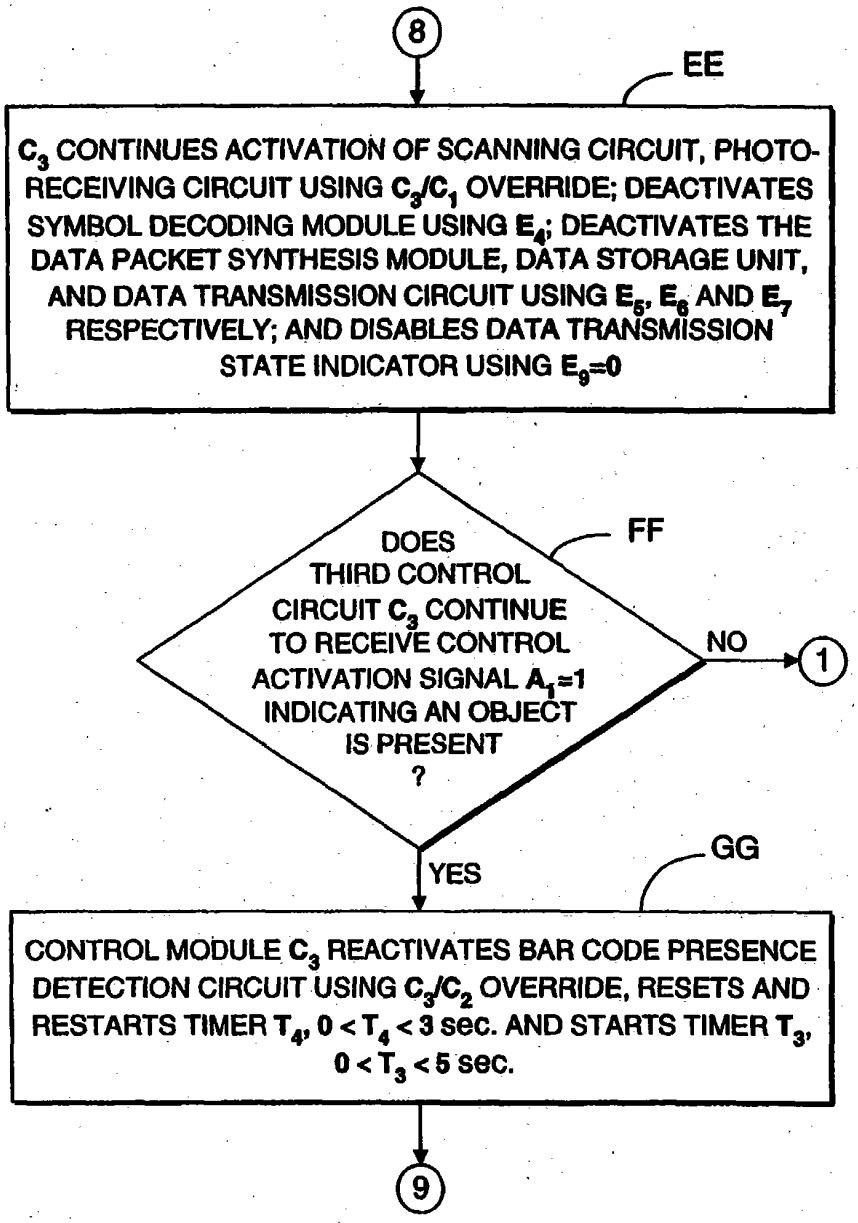

8
EE
C3 CONTINUES ACTIVATION OF SCANNING CIRCUIT, PHOTO-RECEIVING CIRCUIT USING C3/C1 OVERRIDE; DEACTIVATES SYMBOL DECODING MODULE USING E4; DEACTIVATES THE DATA PACKET SYNTHESIS MODULE, DATA STORAGE UNIT, AND DATA TRANSMISSION CIRCUIT USING E5, E6 AND E7 RESPECTIVELY; AND DISABLES DATA TRANSMISSION STATE INDICATOR USING E9=0
FF
DOES THIRD CONTROL CIRCUIT C3 CONTINUE TO RECEIVE CONTROL ACTIVATION SIGNAL A1=1 INDICATING AN OBJECT IS PRESENT ?
NO
1
YES
GG
CONTROL MODULE C3 REACTIVATES BAR CODE PRESENCE DETECTION CIRCUIT USING C3/C2 OVERRIDE, RESETS AND RESTARTS TIMER T4, 0 < T4 < 3 sec. AND STARTS TIMER T3, 0 < T3 < 5 sec.
9

FIG. 33E

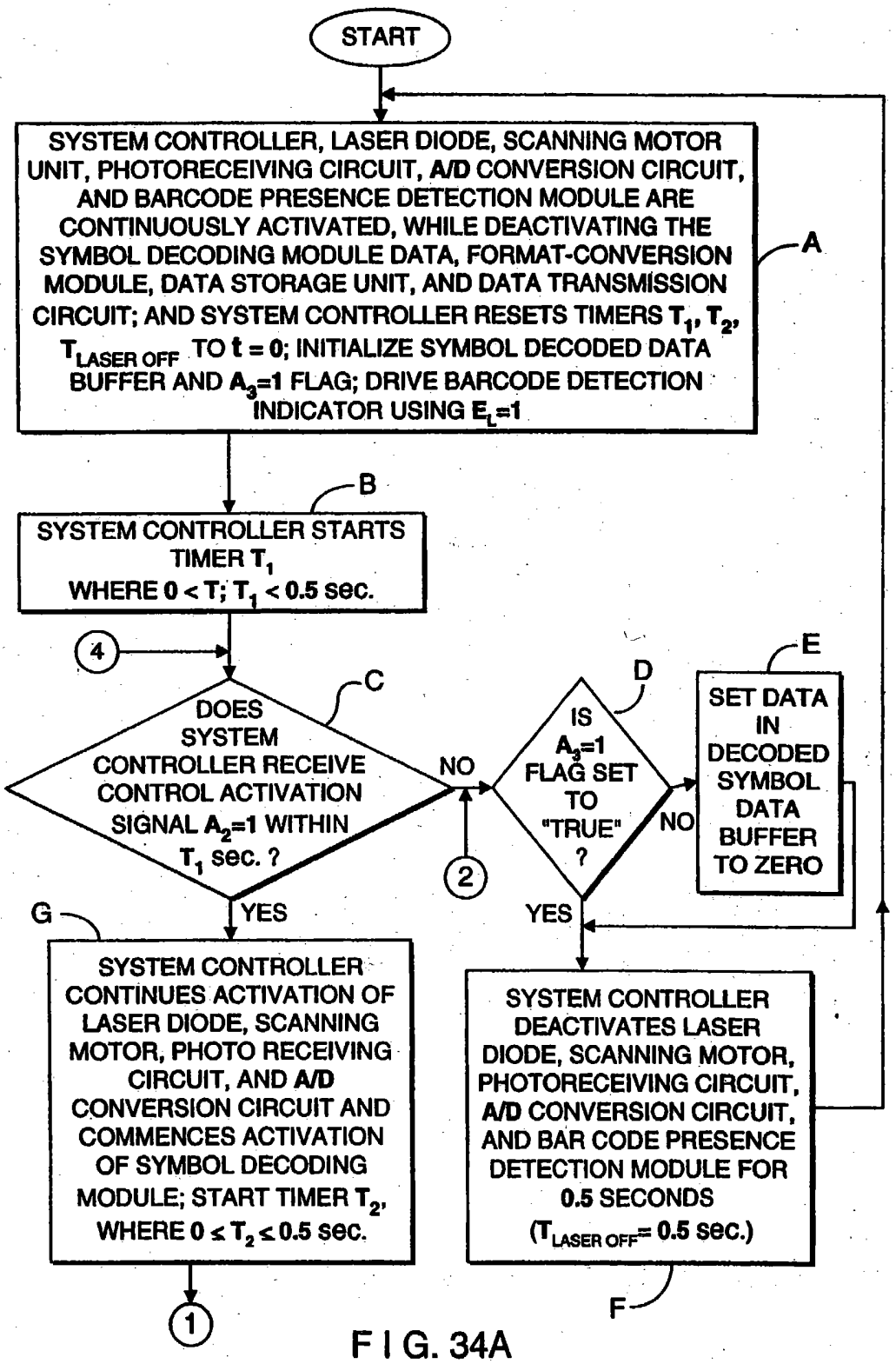

START
SYSTEM CONTROLLER, LASER DIODE, SCANNING MOTOR UNIT, PHOTORECEIVING CIRCUIT, A/D CONVERSION CIRCUIT, AND BARCODE PRESENCE DETECTION MODULE ARE CONTINUOUSLY ACTIVATED, WHILE DEACTIVATING THE SYMBOL DECODING MODULE DATA, FORMAT-CONVERSION MODULE, DATA STORAGE UNIT, AND DATA TRANSMISSION CIRCUIT; AND SYSTEM CONTROLLER RESETS TIMERS T_1, T_2, $T_{LASER\ OFF}$ TO t = 0; INITIALIZE SYMBOL DECODED DATA BUFFER AND A_3=1 FLAG; DRIVE BARCODE DETECTION INDICATOR USING E_L=1
A
SYSTEM CONTROLLER STARTS TIMER T_1 WHERE 0 < T; T_1 < 0.5 sec.
B
4
DOES SYSTEM CONTROLLER RECEIVE CONTROL ACTIVATION SIGNAL A_2=1 WITHIN T_1 sec. ?
C
NO
YES
IS A_3=1 FLAG SET TO "TRUE" ?
D
NO
YES
SET DATA IN DECODED SYMBOL DATA BUFFER TO ZERO
E
2
G
SYSTEM CONTROLLER CONTINUES ACTIVATION OF LASER DIODE, SCANNING MOTOR, PHOTO RECEIVING CIRCUIT, AND A/D CONVERSION CIRCUIT AND COMMENCES ACTIVATION OF SYMBOL DECODING MODULE; START TIMER T_2, WHERE 0 ≤ T_2 ≤ 0.5 sec.
SYSTEM CONTROLLER DEACTIVATES LASER DIODE, SCANNING MOTOR, PHOTORECEIVING CIRCUIT, A/D CONVERSION CIRCUIT, AND BAR CODE PRESENCE DETECTION MODULE FOR 0.5 SECONDS ($T_{LASER\ OFF}$= 0.5 sec.)
F
1

FIG. 34A

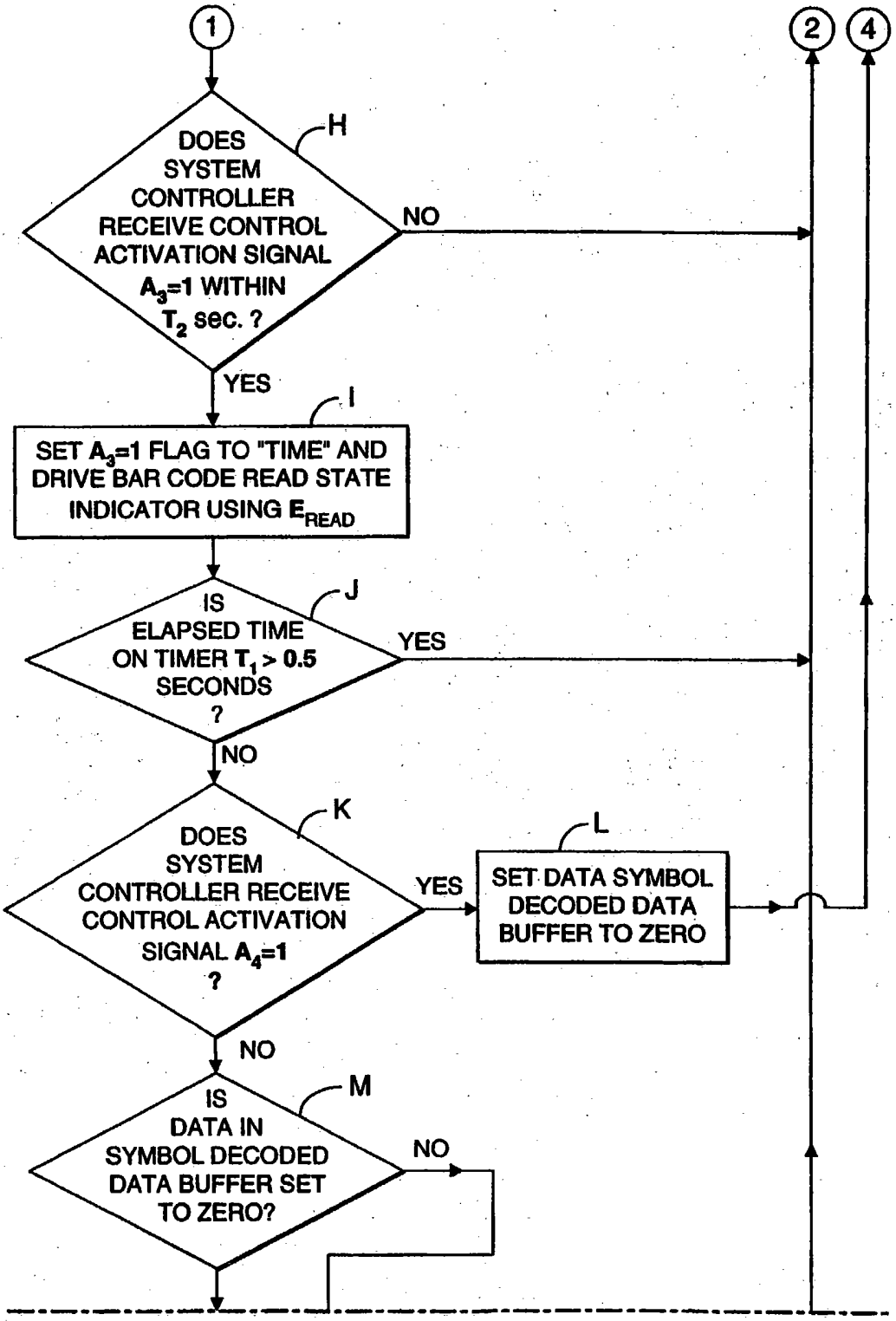

1
2
4
H
DOES SYSTEM CONTROLLER RECEIVE CONTROL ACTIVATION SIGNAL A_3=1 WITHIN T_2 sec. ?
NO
YES
I
SET A_3=1 FLAG TO "TIME" AND DRIVE BAR CODE READ STATE INDICATOR USING E_{READ}
J
IS ELAPSED TIME ON TIMER T_1 > 0.5 SECONDS ?
YES
NO
K
DOES SYSTEM CONTROLLER RECEIVE CONTROL ACTIVATION SIGNAL A_4=1 ?
YES
L
SET DATA SYMBOL DECODED DATA BUFFER TO ZERO
NO
M
IS DATA IN SYMBOL DECODED DATA BUFFER SET TO ZERO?
NO

FIG. 34B1

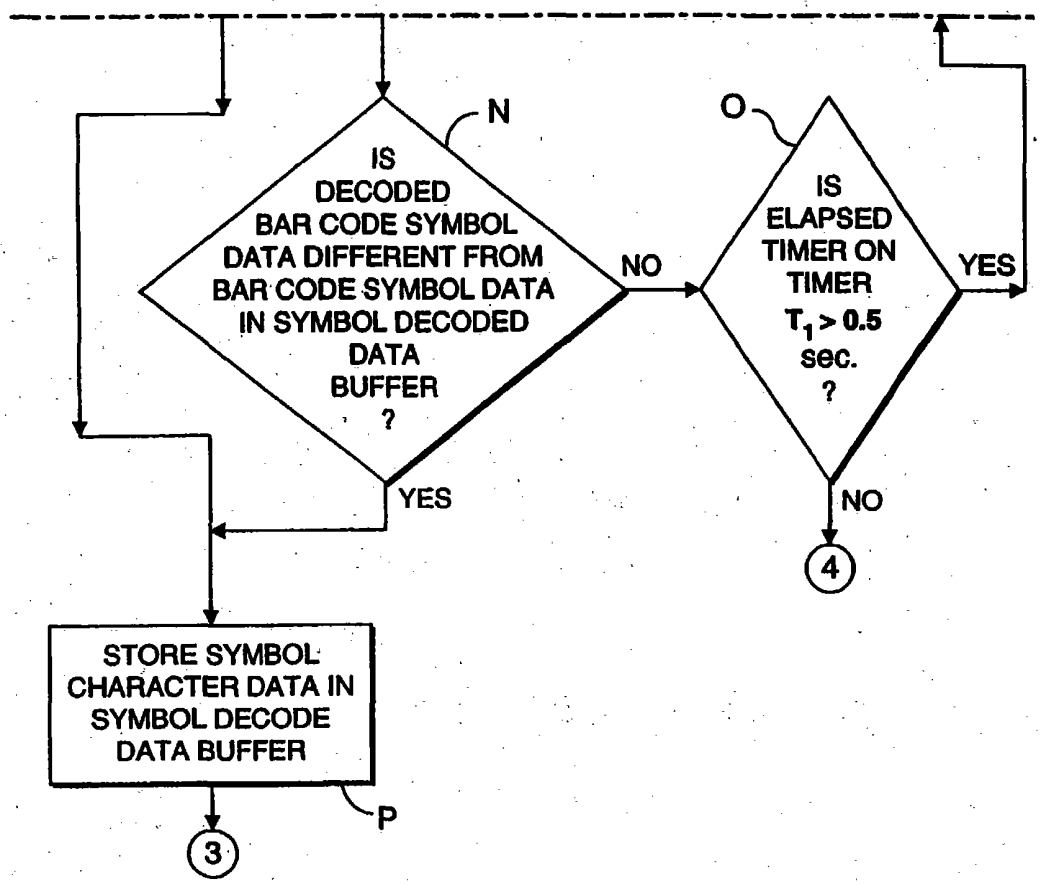

N
IS DECODED BAR CODE SYMBOL DATA DIFFERENT FROM BAR CODE SYMBOL DATA IN SYMBOL DECODED DATA BUFFER ?
NO
O
IS ELAPSED TIMER ON TIMER $T_1 > 0.5$ sec. ?
YES
NO
4
YES
STORE SYMBOL CHARACTER DATA IN SYMBOL DECODE DATA BUFFER
P
3

FIG. 34B2

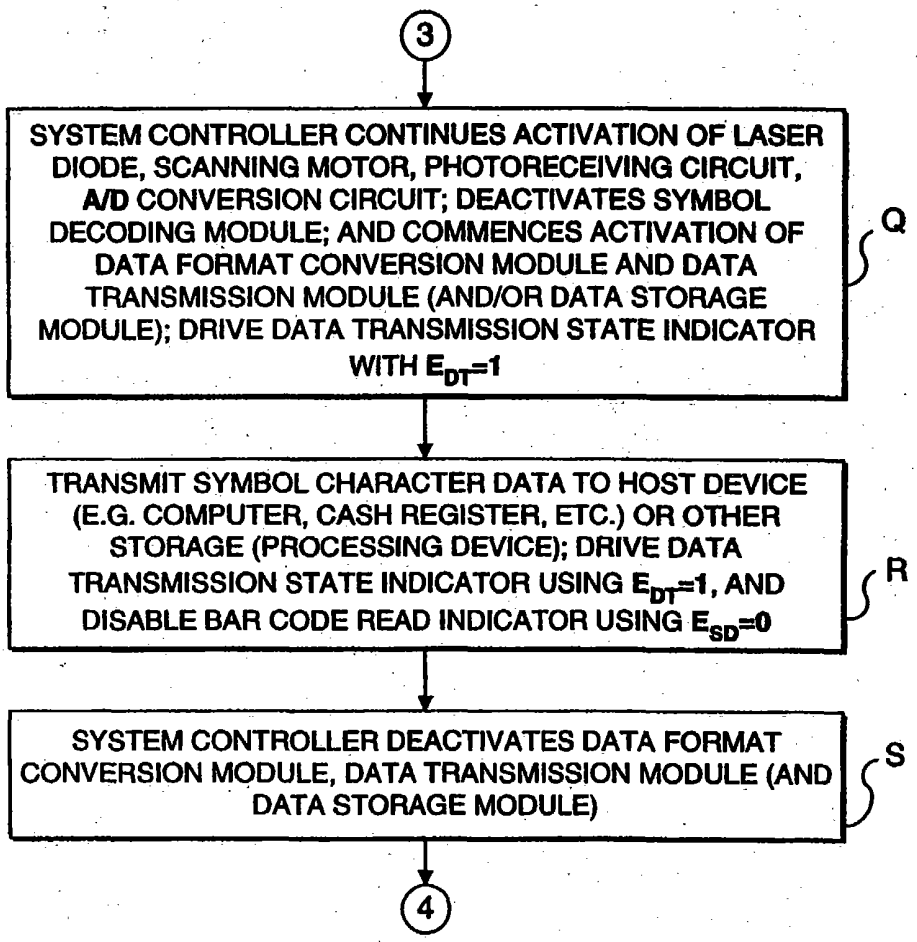

3
SYSTEM CONTROLLER CONTINUES ACTIVATION OF LASER DIODE, SCANNING MOTOR, PHOTORECEIVING CIRCUIT, A/D CONVERSION CIRCUIT; DEACTIVATES SYMBOL DECODING MODULE; AND COMMENCES ACTIVATION OF DATA FORMAT CONVERSION MODULE AND DATA TRANSMISSION MODULE (AND/OR DATA STORAGE MODULE); DRIVE DATA TRANSMISSION STATE INDICATOR WITH E_{DT}=1
Q
TRANSMIT SYMBOL CHARACTER DATA TO HOST DEVICE (E.G. COMPUTER, CASH REGISTER, ETC.) OR OTHER STORAGE (PROCESSING DEVICE); DRIVE DATA TRANSMISSION STATE INDICATOR USING E_{DT}=1, AND DISABLE BAR CODE READ INDICATOR USING E_{SD}=0
R
SYSTEM CONTROLLER DEACTIVATES DATA FORMAT CONVERSION MODULE, DATA TRANSMISSION MODULE (AND DATA STORAGE MODULE)
S
4

FIG. 34C

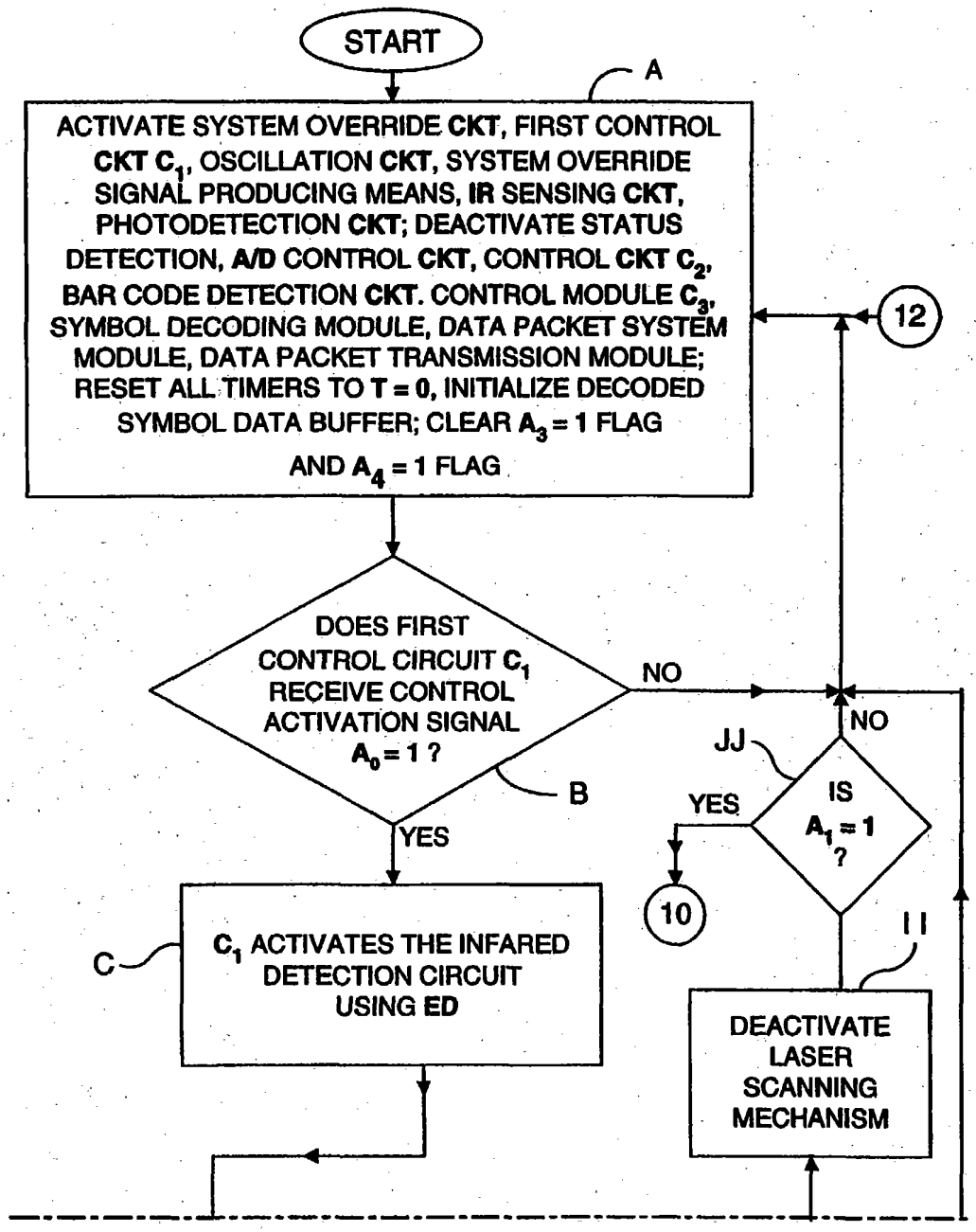

START
A
ACTIVATE SYSTEM OVERRIDE CKT, FIRST CONTROL CKT C_1, OSCILLATION CKT, SYSTEM OVERRIDE SIGNAL PRODUCING MEANS, IR SENSING CKT, PHOTODETECTION CKT; DEACTIVATE STATUS DETECTION, A/D CONTROL CKT, CONTROL CKT C_2, BAR CODE DETECTION CKT. CONTROL MODULE C_3, SYMBOL DECODING MODULE, DATA PACKET SYSTEM MODULE, DATA PACKET TRANSMISSION MODULE; RESET ALL TIMERS TO T = 0, INITIALIZE DECODED SYMBOL DATA BUFFER; CLEAR A_3 = 1 FLAG AND A_4 = 1 FLAG
12
DOES FIRST CONTROL CIRCUIT C_1 RECEIVE CONTROL ACTIVATION SIGNAL A_0 = 1 ?
NO
B
YES
NO
JJ
IS A_1 = 1 ?
YES
10
C
C_1 ACTIVATES THE INFARED DETECTION CIRCUIT USING ED
II
DEACTIVATE LASER SCANNING MECHANISM

FIG. 35A1

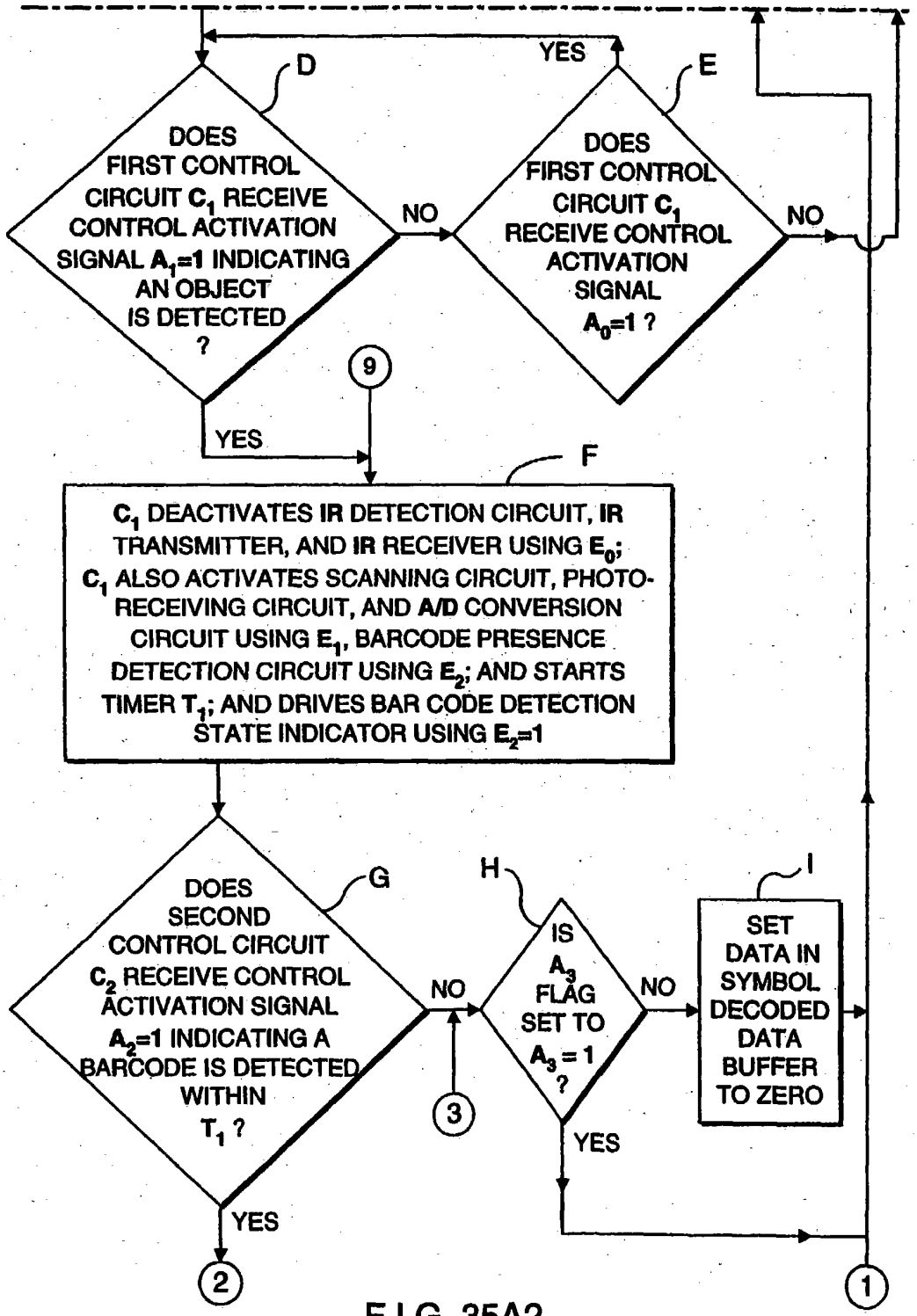

D
DOES FIRST CONTROL CIRCUIT C_1 RECEIVE CONTROL ACTIVATION SIGNAL A_1=1 INDICATING AN OBJECT IS DETECTED ?
NO
E
DOES FIRST CONTROL CIRCUIT C_1 RECEIVE CONTROL ACTIVATION SIGNAL A_0=1 ?
YES
NO
9
YES
F
C_1 DEACTIVATES IR DETECTION CIRCUIT, IR TRANSMITTER, AND IR RECEIVER USING E_0; C_1 ALSO ACTIVATES SCANNING CIRCUIT, PHOTO-RECEIVING CIRCUIT, AND A/D CONVERSION CIRCUIT USING E_1, BARCODE PRESENCE DETECTION CIRCUIT USING E_2; AND STARTS TIMER T_1; AND DRIVES BAR CODE DETECTION STATE INDICATOR USING E_2=1
G
DOES SECOND CONTROL CIRCUIT C_2 RECEIVE CONTROL ACTIVATION SIGNAL A_2=1 INDICATING A BARCODE IS DETECTED WITHIN T_1 ?
NO
H
IS A_3 FLAG SET TO A_3 = 1 ?
NO
I
SET DATA IN SYMBOL DECODED DATA BUFFER TO ZERO
YES
YES
3
2
1

FIG. 35A2

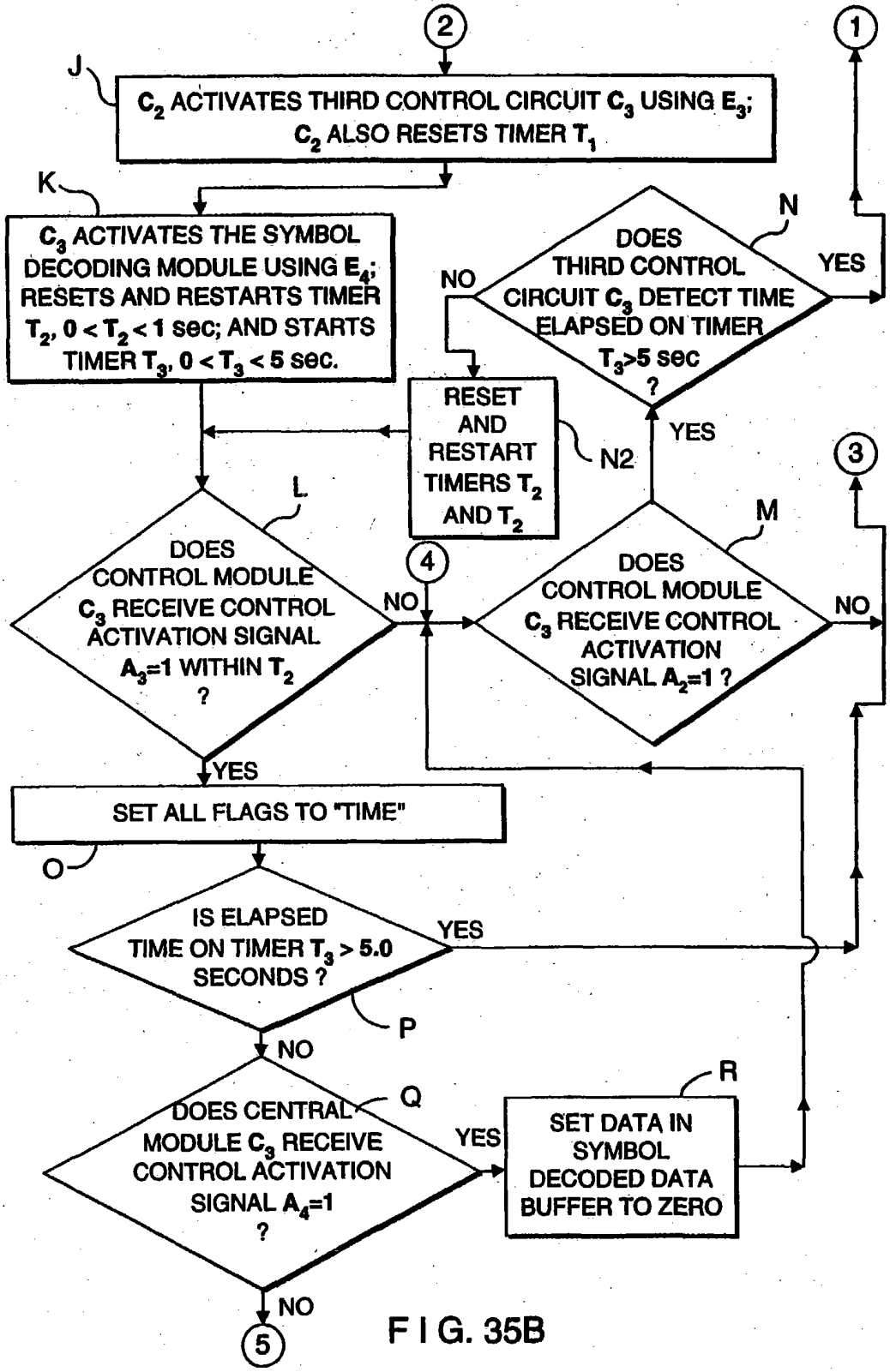

2
1
J
C_2 ACTIVATES THIRD CONTROL CIRCUIT C_3 USING E_3; C_2 ALSO RESETS TIMER T_1
K
C_3 ACTIVATES THE SYMBOL DECODING MODULE USING E_4; RESETS AND RESTARTS TIMER T_2, $0 < T_2 < 1$ sec; AND STARTS TIMER T_3, $0 < T_3 < 5$ sec.
N
DOES THIRD CONTROL CIRCUIT C_3 DETECT TIME ELAPSED ON TIMER T_3>5 sec ?
NO
YES
RESET AND RESTART TIMERS T_2 AND T_2
N2
YES
3
L
M
4
DOES CONTROL MODULE C_3 RECEIVE CONTROL ACTIVATION SIGNAL A_3=1 WITHIN T_2 ?
NO
DOES CONTROL MODULE C_3 RECEIVE CONTROL ACTIVATION SIGNAL A_2=1 ?
NO
YES
SET ALL FLAGS TO "TIME"
O
IS ELAPSED TIME ON TIMER T_3 > 5.0 SECONDS ?
YES
P
NO
R
Q
DOES CENTRAL MODULE C_3 RECEIVE CONTROL ACTIVATION SIGNAL A_4=1 ?
YES
SET DATA IN SYMBOL DECODED DATA BUFFER TO ZERO
NO
5

FIG. 35B

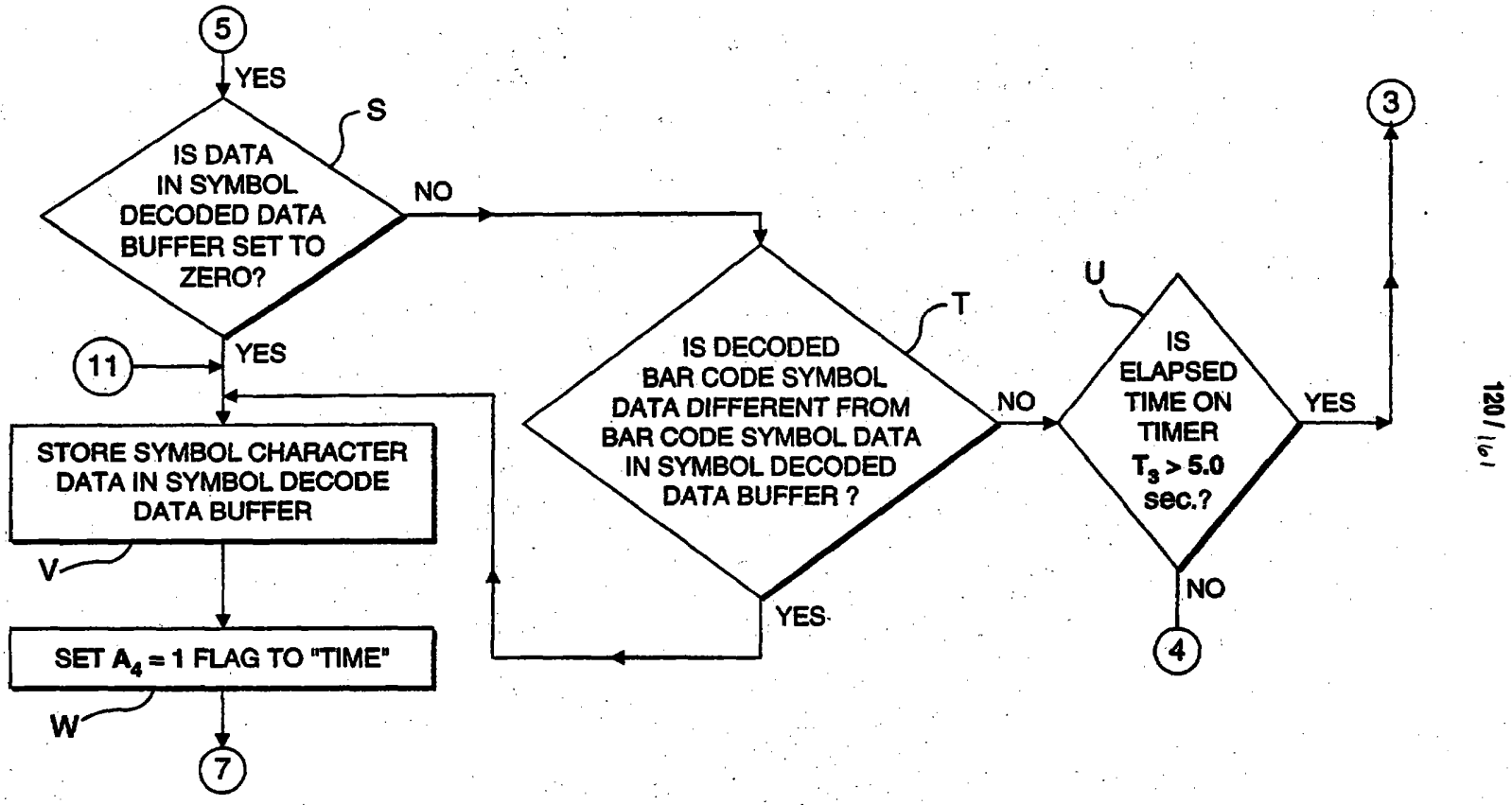

5
YES
S
IS DATA IN SYMBOL DECODED DATA BUFFER SET TO ZERO?
NO
11
YES
STORE SYMBOL CHARACTER DATA IN SYMBOL DECODE DATA BUFFER
V
SET A_4 = 1 FLAG TO "TIME"
W
7
IS DECODED BAR CODE SYMBOL DATA DIFFERENT FROM BAR CODE SYMBOL DATA IN SYMBOL DECODED DATA BUFFER ?
T
NO
YES
U
IS ELAPSED TIME ON TIMER T_3 > 5.0 sec.?
YES
NO
3
4
120

FIG. 35C

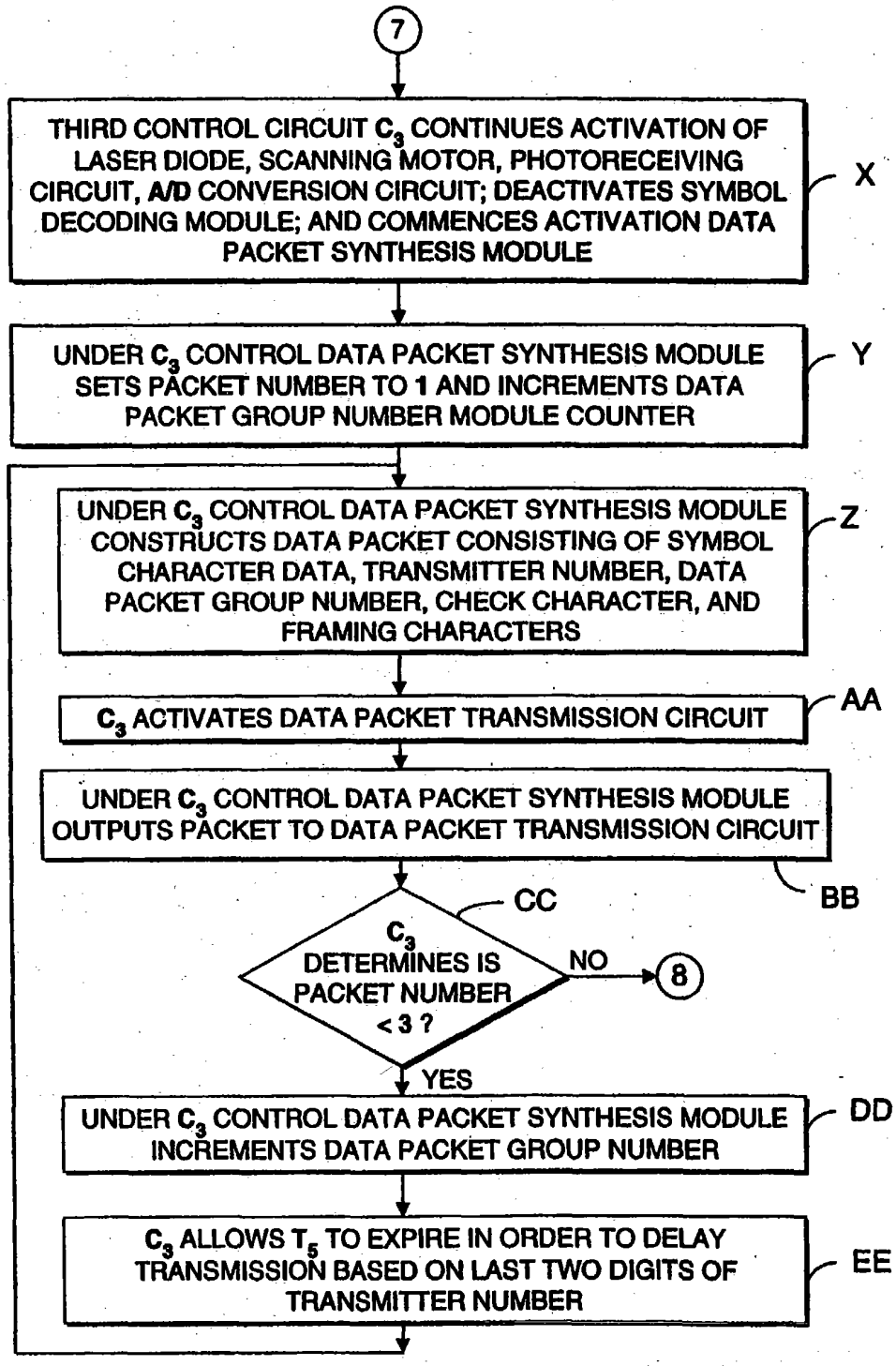

7
THIRD CONTROL CIRCUIT C_3 CONTINUES ACTIVATION OF LASER DIODE, SCANNING MOTOR, PHOTORECEIVING CIRCUIT, A/D CONVERSION CIRCUIT; DEACTIVATES SYMBOL DECODING MODULE; AND COMMENCES ACTIVATION DATA PACKET SYNTHESIS MODULE
X
UNDER C_3 CONTROL DATA PACKET SYNTHESIS MODULE SETS PACKET NUMBER TO 1 AND INCREMENTS DATA PACKET GROUP NUMBER MODULE COUNTER
Y
UNDER C_3 CONTROL DATA PACKET SYNTHESIS MODULE CONSTRUCTS DATA PACKET CONSISTING OF SYMBOL CHARACTER DATA, TRANSMITTER NUMBER, DATA PACKET GROUP NUMBER, CHECK CHARACTER, AND FRAMING CHARACTERS
Z
C_3 ACTIVATES DATA PACKET TRANSMISSION CIRCUIT
AA
UNDER C_3 CONTROL DATA PACKET SYNTHESIS MODULE OUTPUTS PACKET TO DATA PACKET TRANSMISSION CIRCUIT
BB
CC
C_3 DETERMINES IS PACKET NUMBER < 3 ?
NO
8
YES
UNDER C_3 CONTROL DATA PACKET SYNTHESIS MODULE INCREMENTS DATA PACKET GROUP NUMBER
DD
C_3 ALLOWS T_5 TO EXPIRE IN ORDER TO DELAY TRANSMISSION BASED ON LAST TWO DIGITS OF TRANSMITTER NUMBER
EE

FIG. 35D

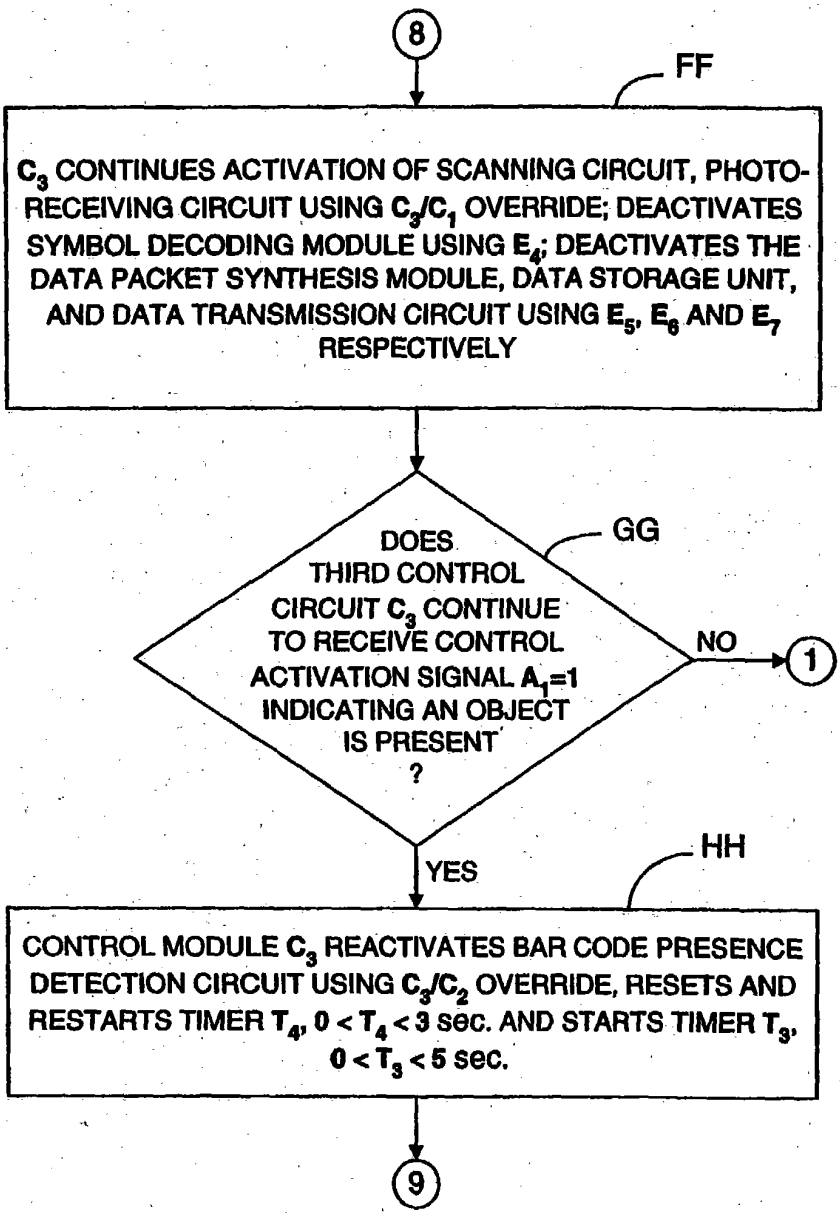

8
FF
C_3 CONTINUES ACTIVATION OF SCANNING CIRCUIT, PHOTO-RECEIVING CIRCUIT USING C_3/C_1 OVERRIDE; DEACTIVATES SYMBOL DECODING MODULE USING E_4; DEACTIVATES THE DATA PACKET SYNTHESIS MODULE, DATA STORAGE UNIT, AND DATA TRANSMISSION CIRCUIT USING E_5, E_6 AND E_7 RESPECTIVELY
GG
DOES THIRD CONTROL CIRCUIT C_3 CONTINUE TO RECEIVE CONTROL ACTIVATION SIGNAL A_1=1 INDICATING AN OBJECT IS PRESENT ?
NO
1
YES
HH
CONTROL MODULE C_3 REACTIVATES BAR CODE PRESENCE DETECTION CIRCUIT USING C_3/C_2 OVERRIDE, RESETS AND RESTARTS TIMER T_4, $0 < T_4 < 3$ sec. AND STARTS TIMER T_3, $0 < T_3 < 5$ sec.
9

FIG. 35E

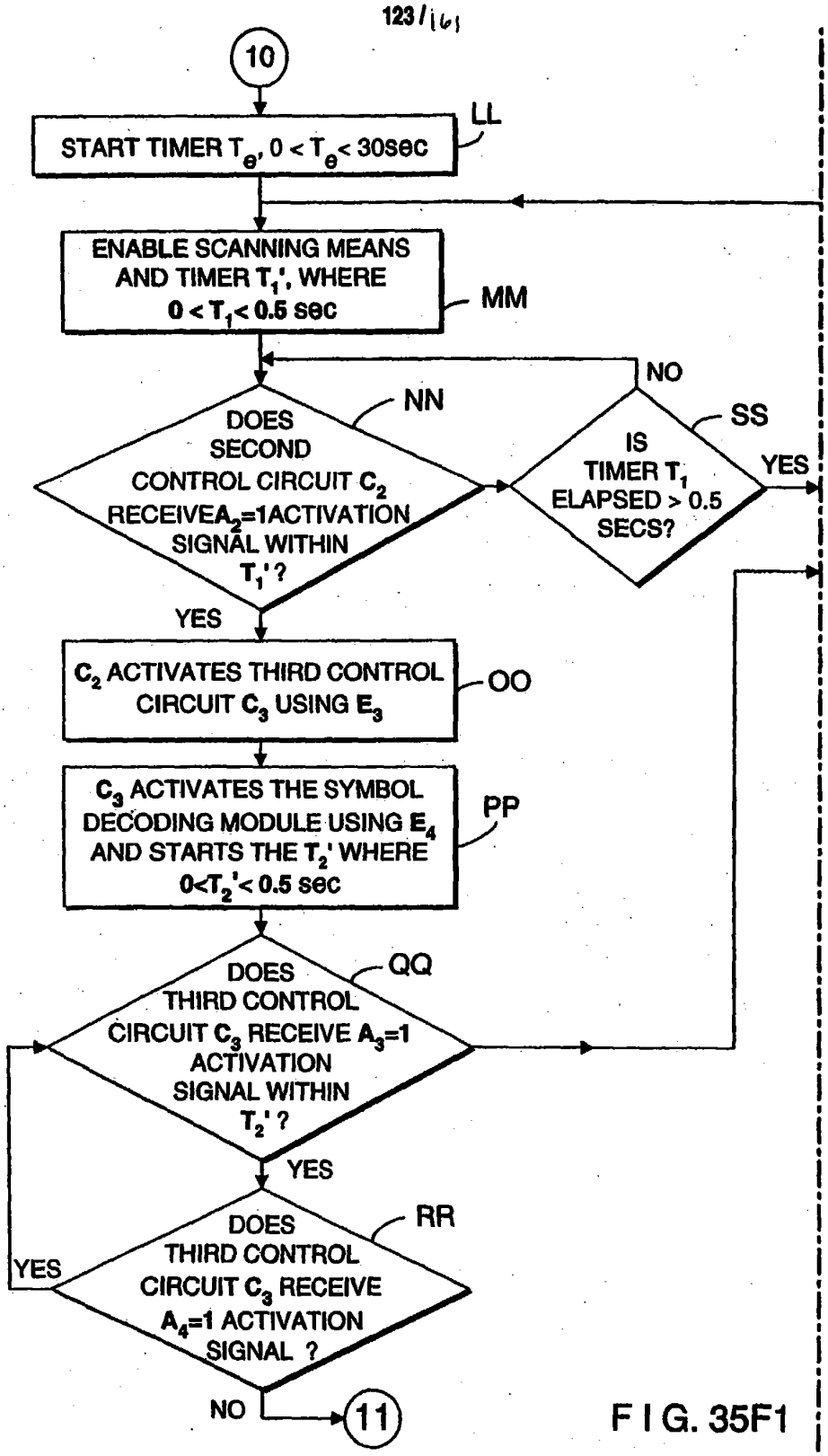

10
START TIMER T_θ, $0 < T_\theta < 30$sec
LL
ENABLE SCANNING MEANS AND TIMER T_1', WHERE $0 < T_1 < 0.5$ sec
MM
DOES SECOND CONTROL CIRCUIT C_2 RECEIVE A_2=1 ACTIVATION SIGNAL WITHIN T_1'?
NN
NO
IS TIMER T_1 ELAPSED > 0.5 SECS?
SS
YES
YES
C_2 ACTIVATES THIRD CONTROL CIRCUIT C_3 USING E_3
OO
C_3 ACTIVATES THE SYMBOL DECODING MODULE USING E_4 AND STARTS THE T_2' WHERE $0 < T_2' < 0.5$ sec
PP
DOES THIRD CONTROL CIRCUIT C_3 RECEIVE A_3=1 ACTIVATION SIGNAL WITHIN T_2'?
QQ
YES
DOES THIRD CONTROL CIRCUIT C_3 RECEIVE A_4=1 ACTIVATION SIGNAL ?
RR
YES
NO
11

FIG. 35F1

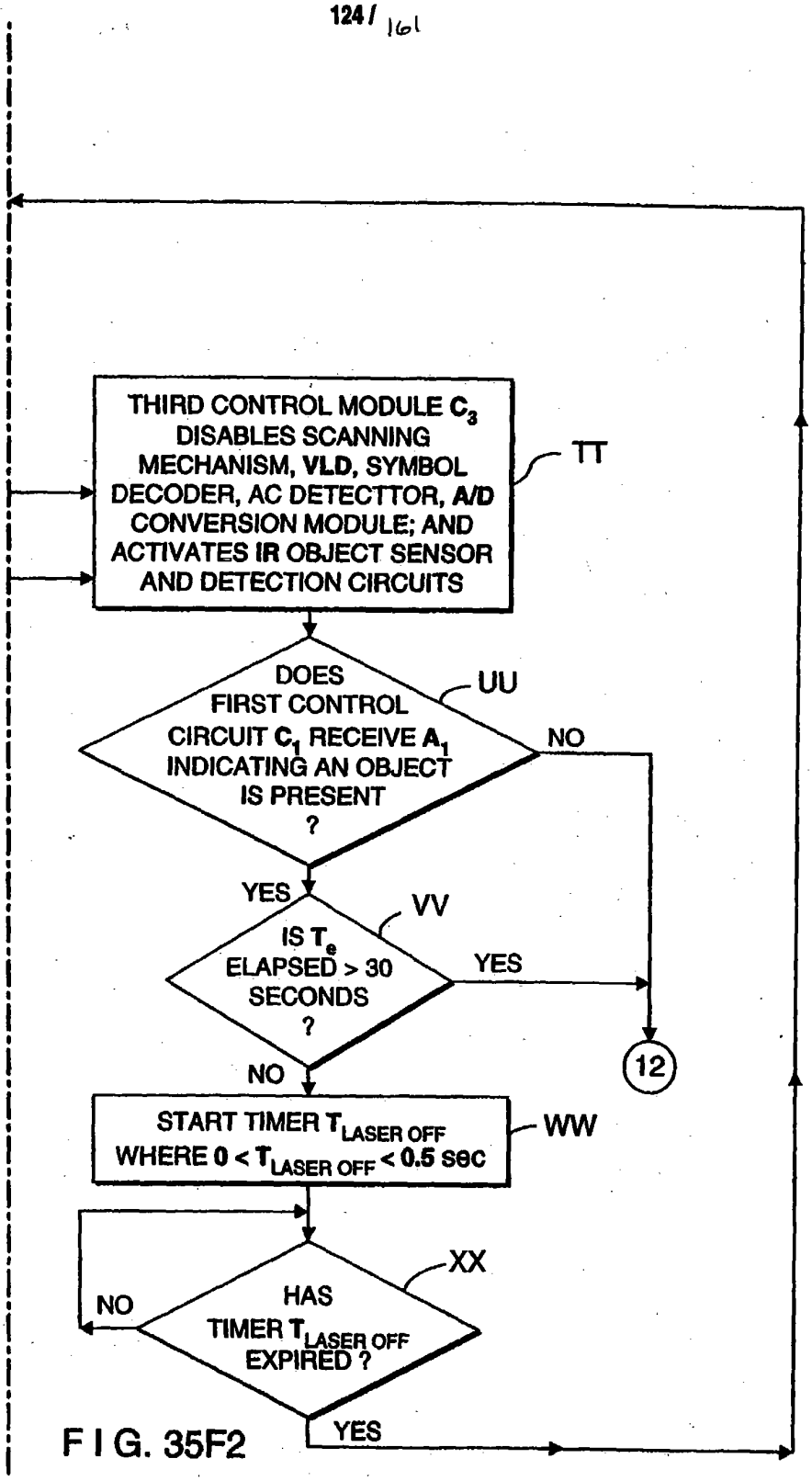

THIRD CONTROL MODULE C_3 DISABLES SCANNING MECHANISM, VLD, SYMBOL DECODER, AC DETECTTOR, A/D CONVERSION MODULE; AND ACTIVATES IR OBJECT SENSOR AND DETECTION CIRCUITS
TT
DOES FIRST CONTROL CIRCUIT C_1 RECEIVE A_1 INDICATING AN OBJECT IS PRESENT ?
UU
NO
YES
IS T_e ELAPSED > 30 SECONDS ?
VV
YES
NO
12
START TIMER $T_{LASER\ OFF}$ WHERE $0 < T_{LASER\ OFF} < 0.5$ sec
WW
HAS TIMER $T_{LASER\ OFF}$ EXPIRED ?
XX
NO
YES

FIG. 35F2

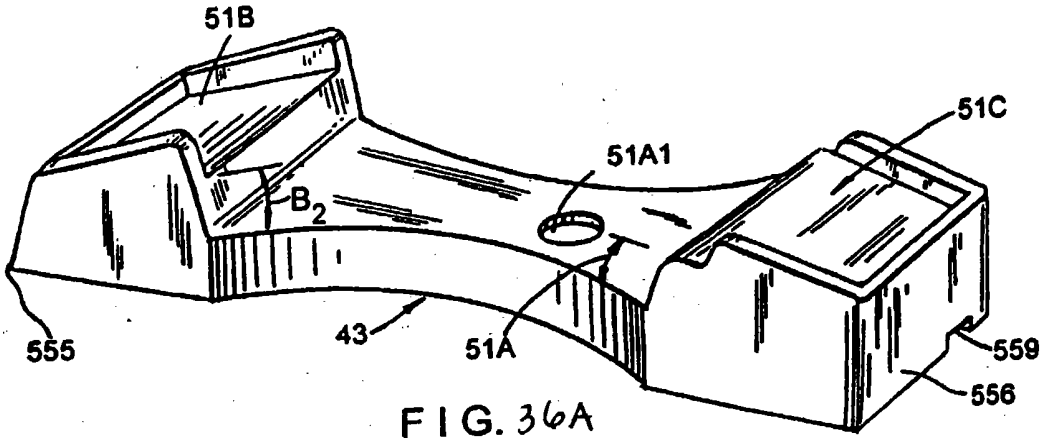


FIG. 36A

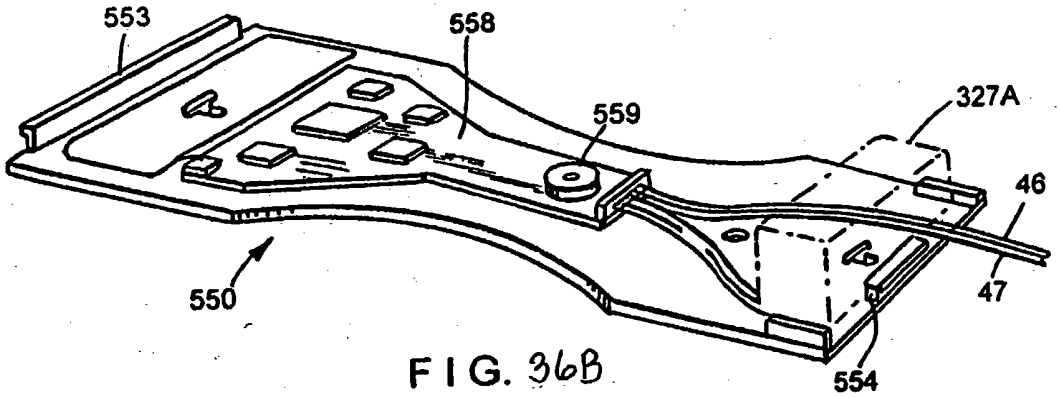


FIG. 36B

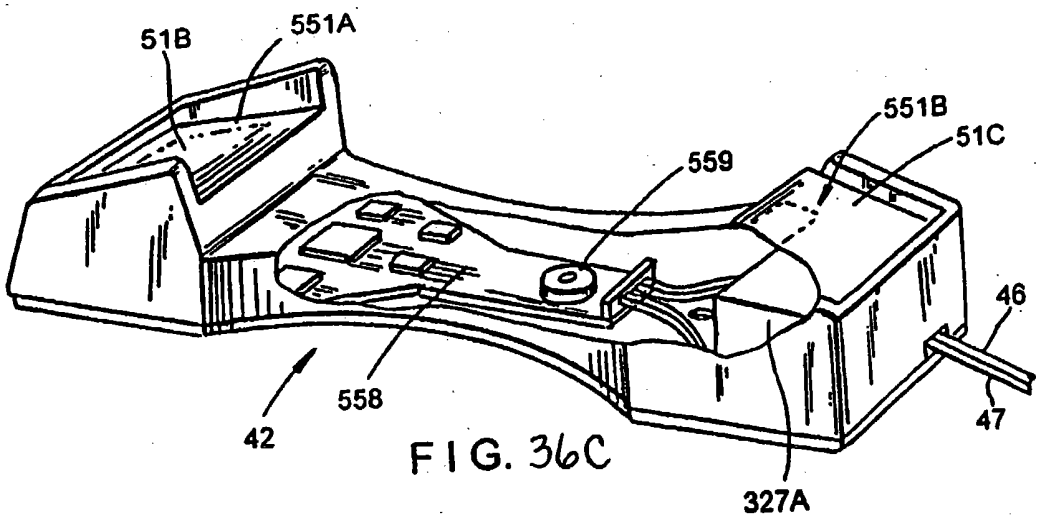


FIG. 36C

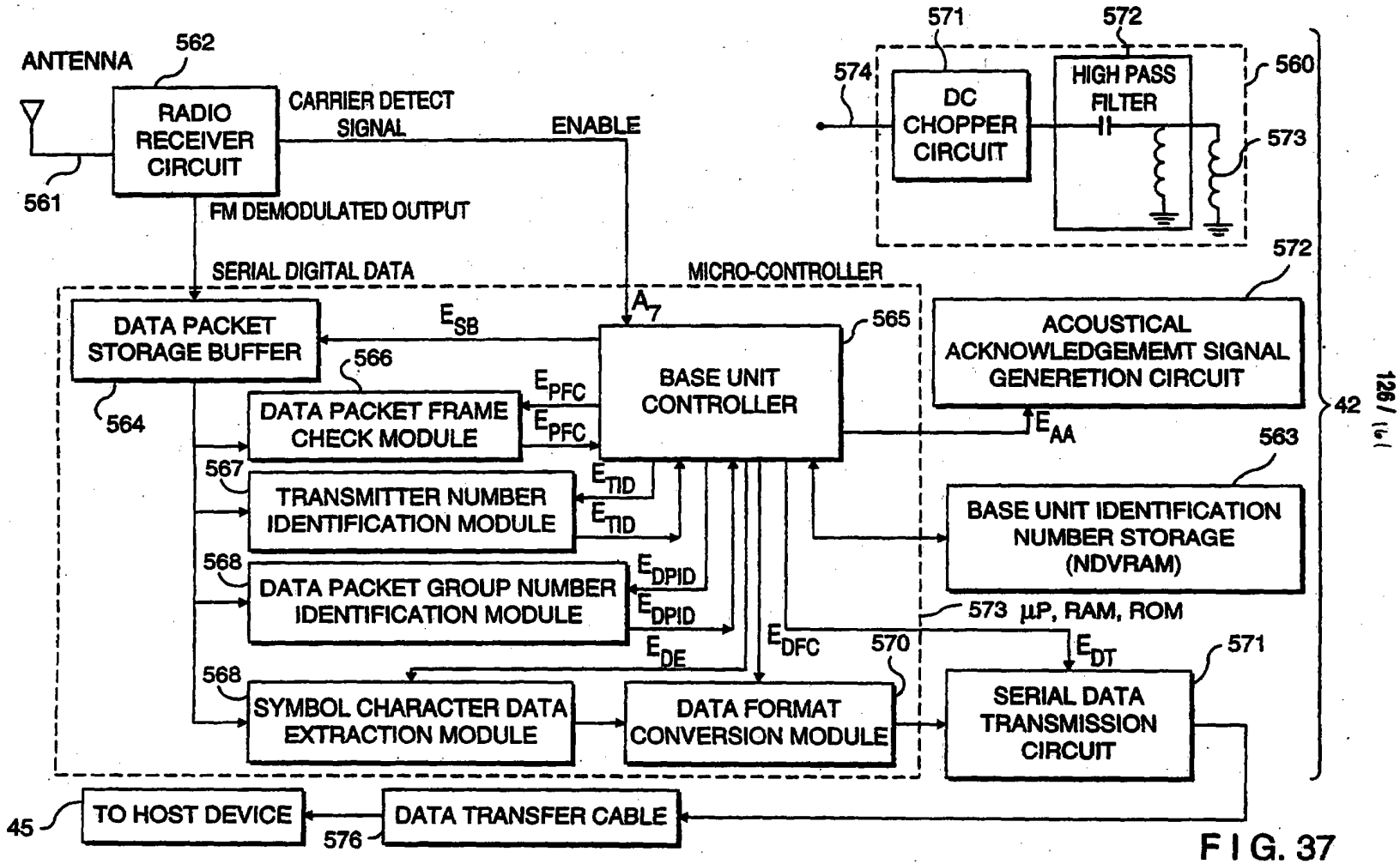

ANTENNA
562
RADIO RECEIVER CIRCUIT
561
CARRIER DETECT SIGNAL
ENABLE
FM DEMODULATED OUTPUT
SERIAL DIGITAL DATA
MICRO-CONTROLLER
571
572
574
DC CHOPPER CIRCUIT
HIGH PASS FILTER
560
573
572
DATA PACKET STORAGE BUFFER
564
E_{SB}
A_7
565
BASE UNIT CONTROLLER
566
DATA PACKET FRAME CHECK MODULE
E_{PFC}
E_{PFC}
ACOUSTICAL ACKNOWLEDGEMEMT SIGNAL GENERETION CIRCUIT
E_{AA}
42
126 (b)
563
567
TRANSMITTER NUMBER IDENTIFICATION MODULE
E_{TID}
E_{TID}
BASE UNIT IDENTIFICATION NUMBER STORAGE (NDVRAM)
568
DATA PACKET GROUP NUMBER IDENTIFICATION MODULE
E_{DPID}
E_{DPID}
573 µP, RAM, ROM
E_{DE}
E_{DFC}
570
E_{DT}
571
568
SYMBOL CHARACTER DATA EXTRACTION MODULE
DATA FORMAT CONVERSION MODULE
SERIAL DATA TRANSMISSION CIRCUIT
45
TO HOST DEVICE
576
DATA TRANSFER CABLE

FIG. 37

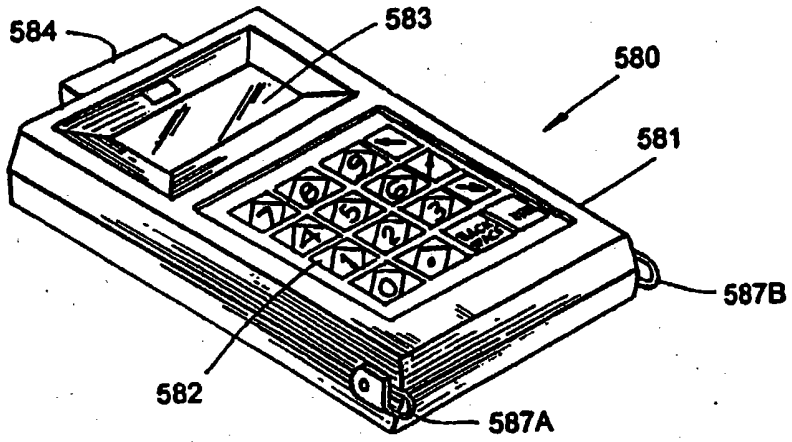


FIG. 38A

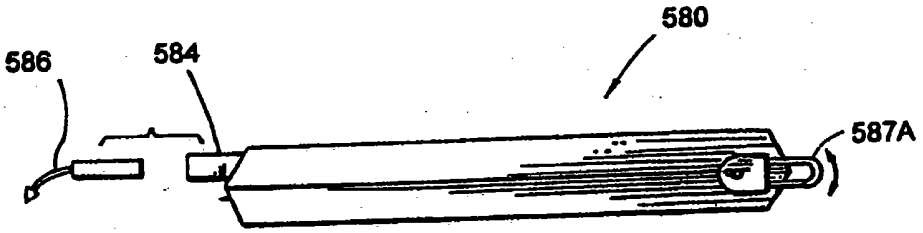


FIG. 38B

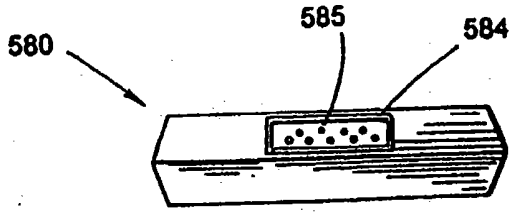


FIG. 38C

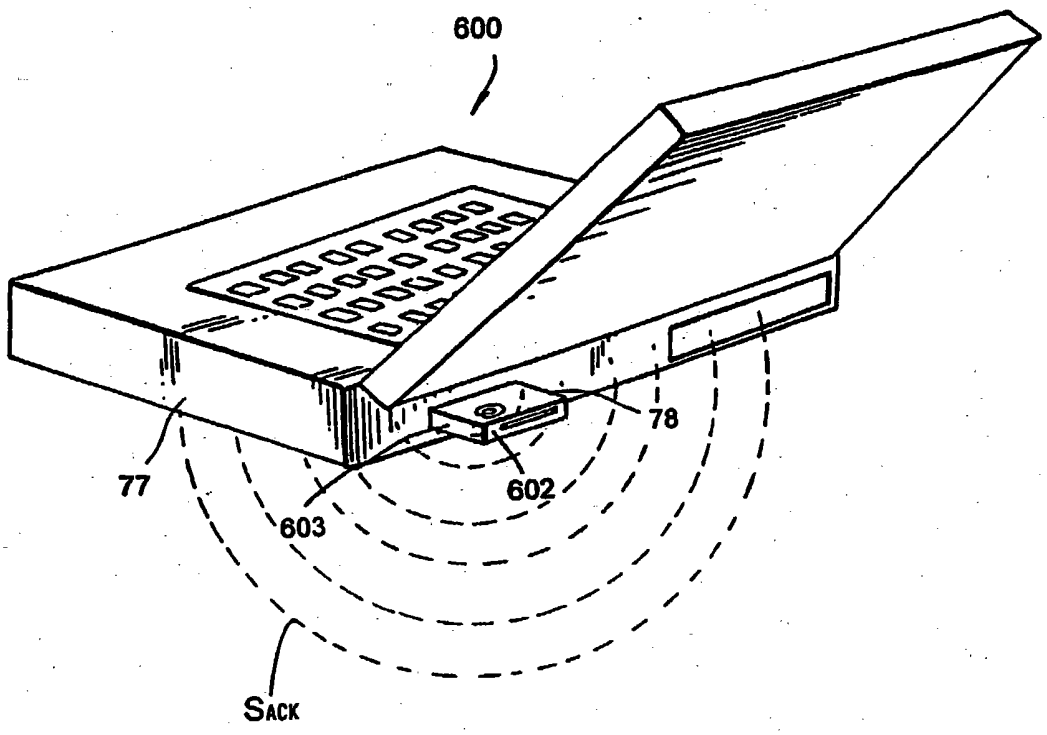


FIG. 39

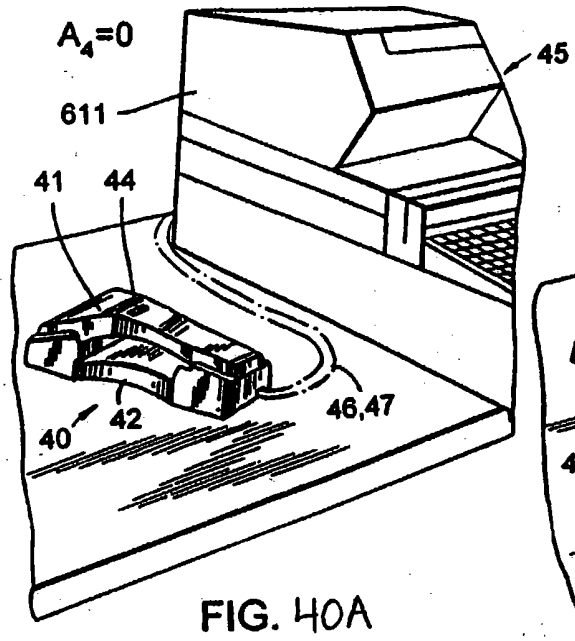


FIG. 40A

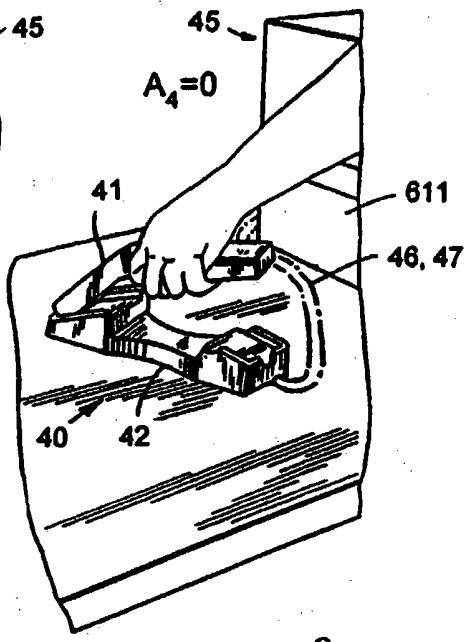


FIG. 40B

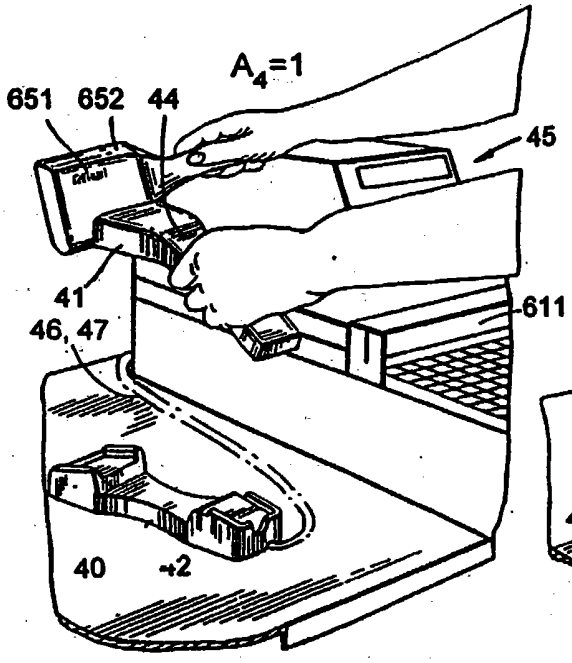


FIG. 40C

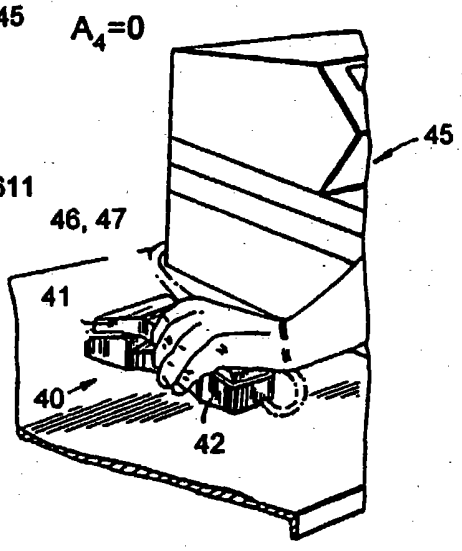


FIG. 40D

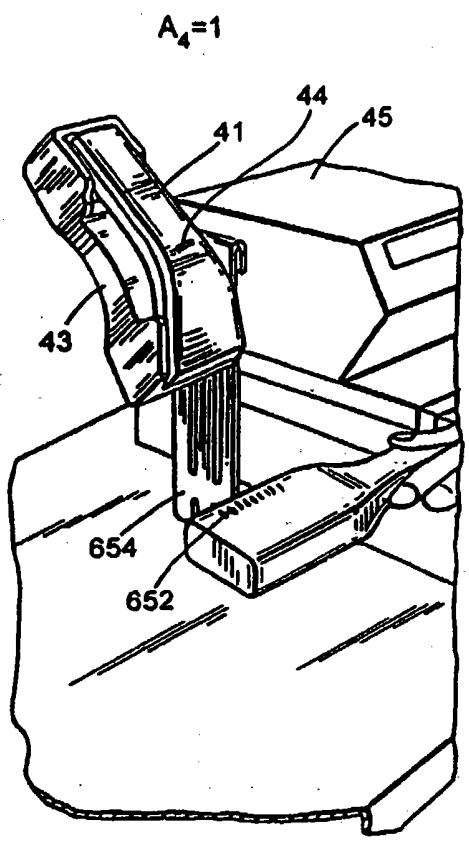


FIG. 41A

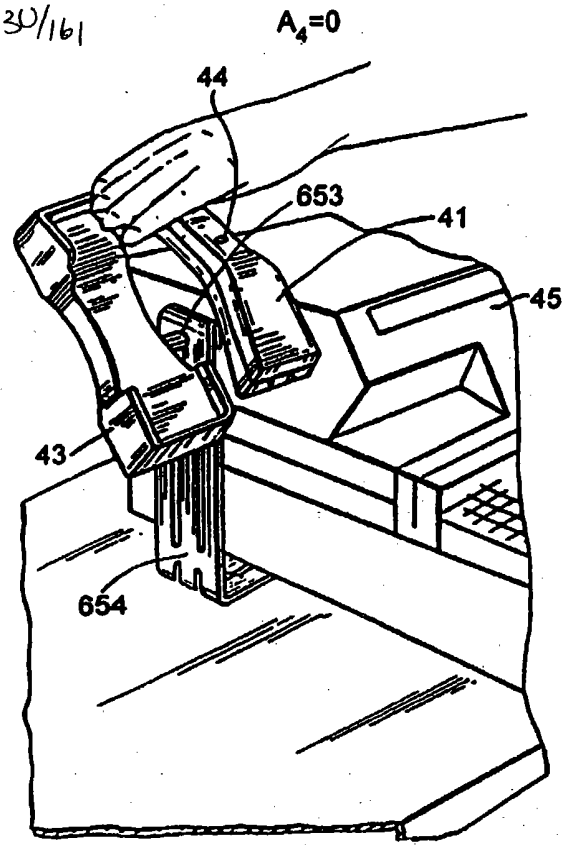


FIG. 41B

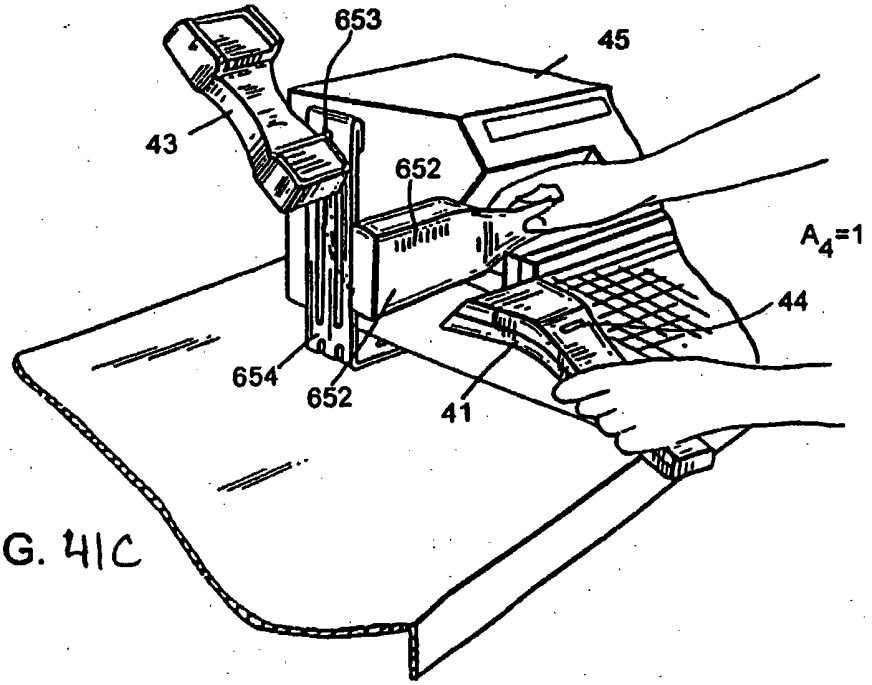


FIG. 41C

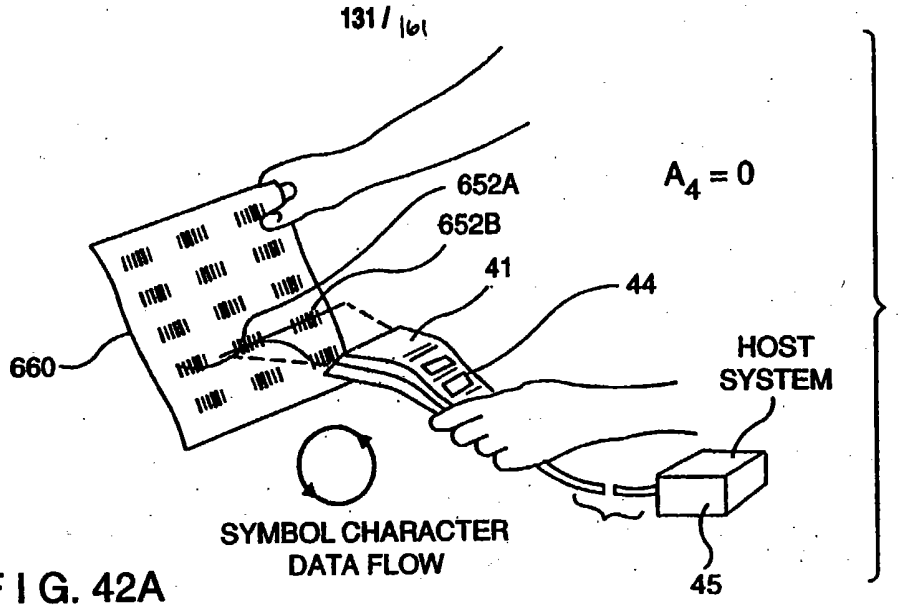


FIG. 42A

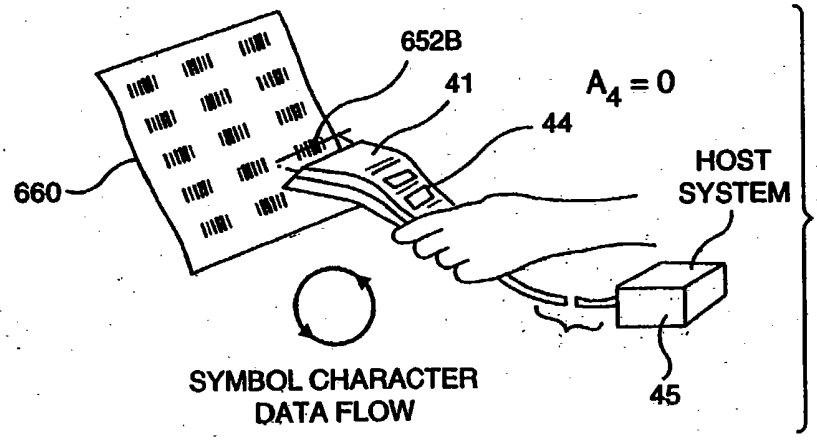


FIG. 42B

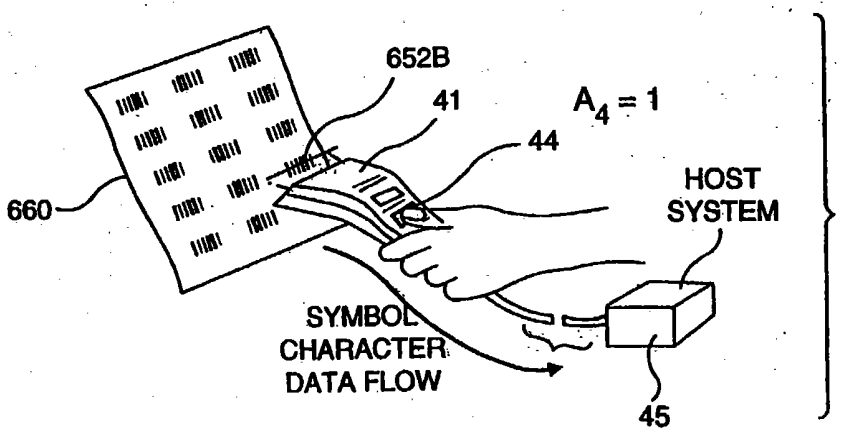
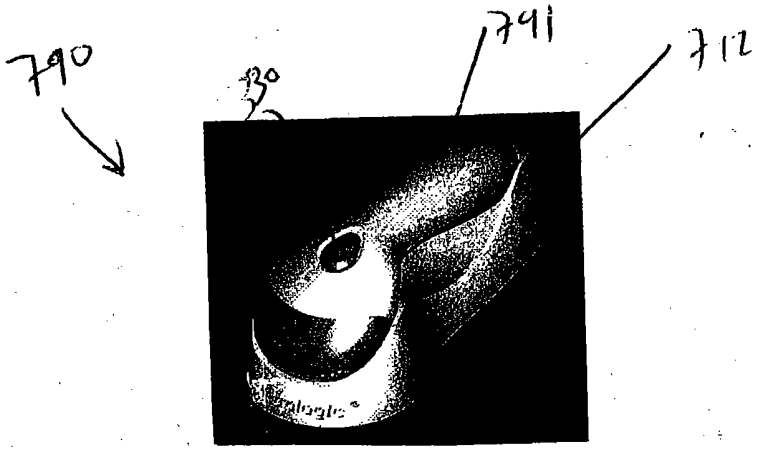


FIG. 42C



Automatic Bar Code Reading System with 2-way RF Communication Link

FIG. 43A

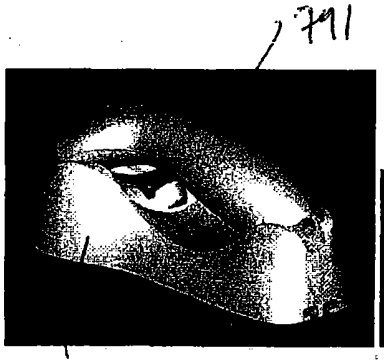


FIG. 43B

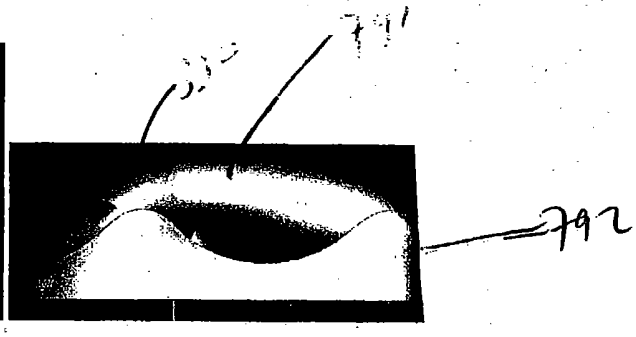


FIG. 43C

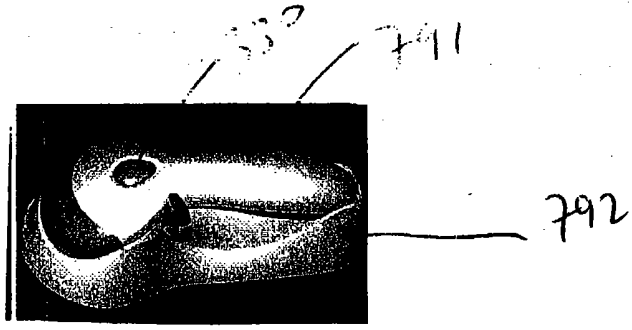


FIG. 43D

Protracted configuration

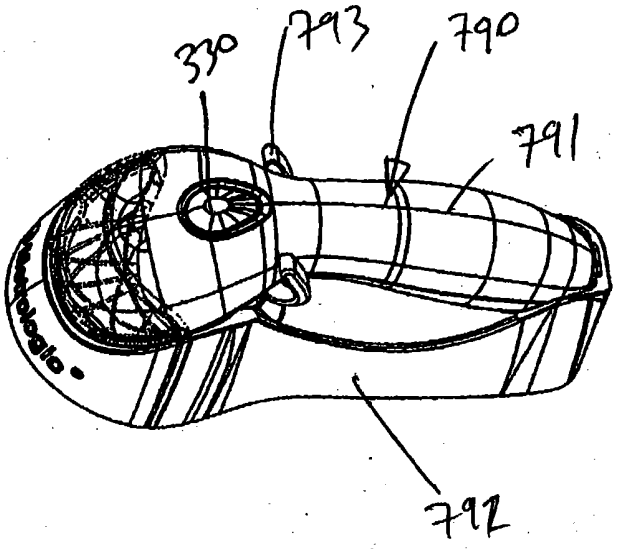


FIG. 43F

Protracted configuration

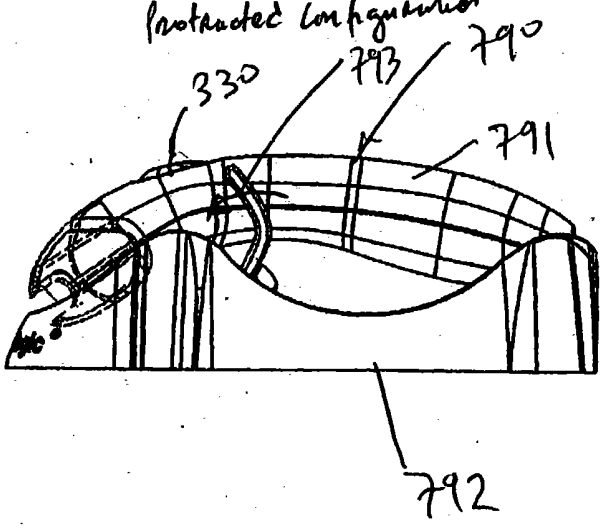


FIG. 43E

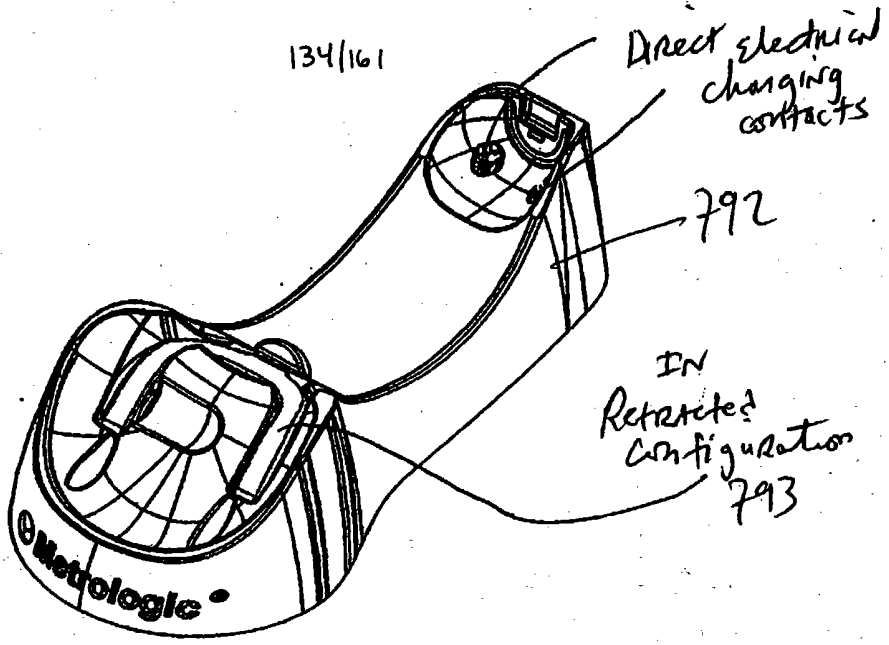


FIG. 43G

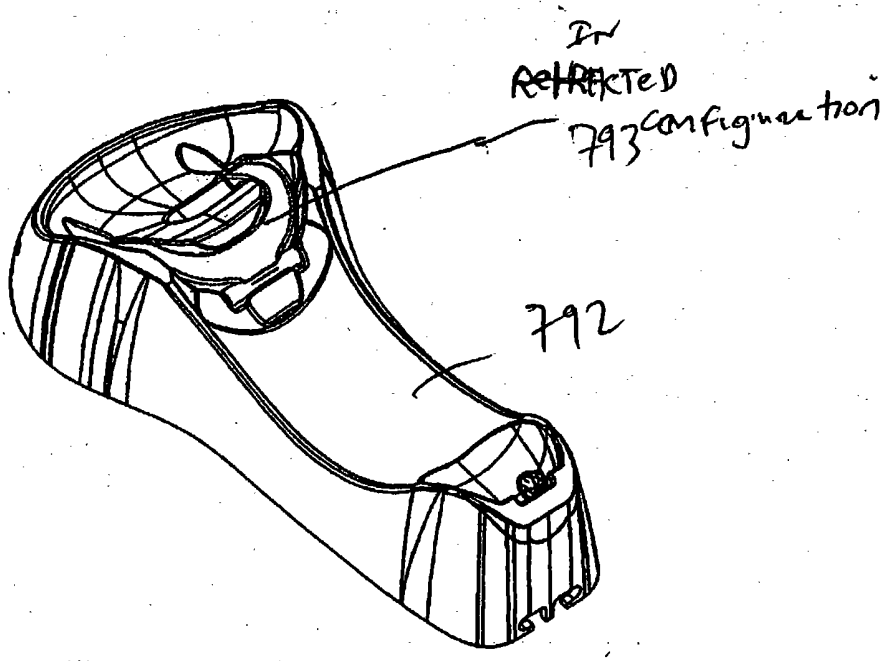


FIG. 43A

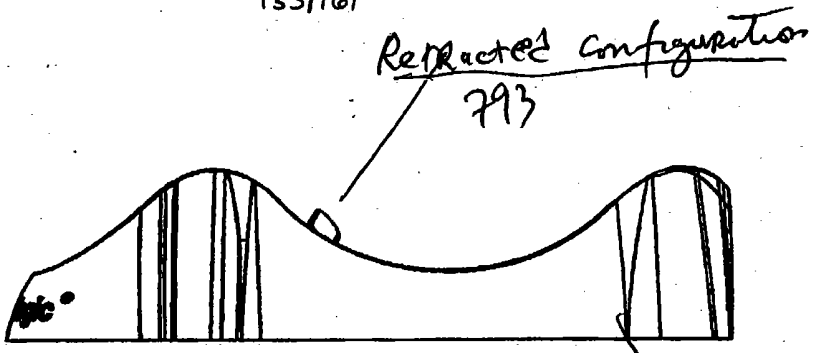


FIG. 43I

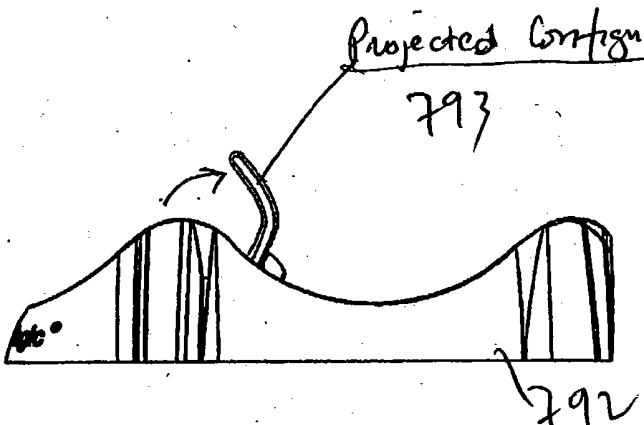


FIG. 43J

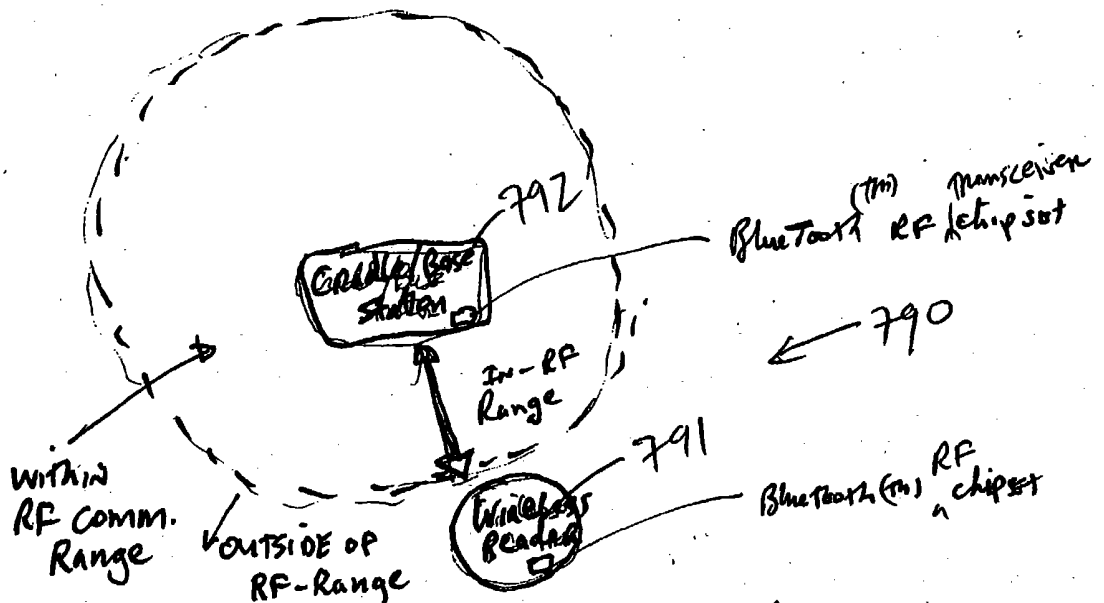


FIG. 44A1

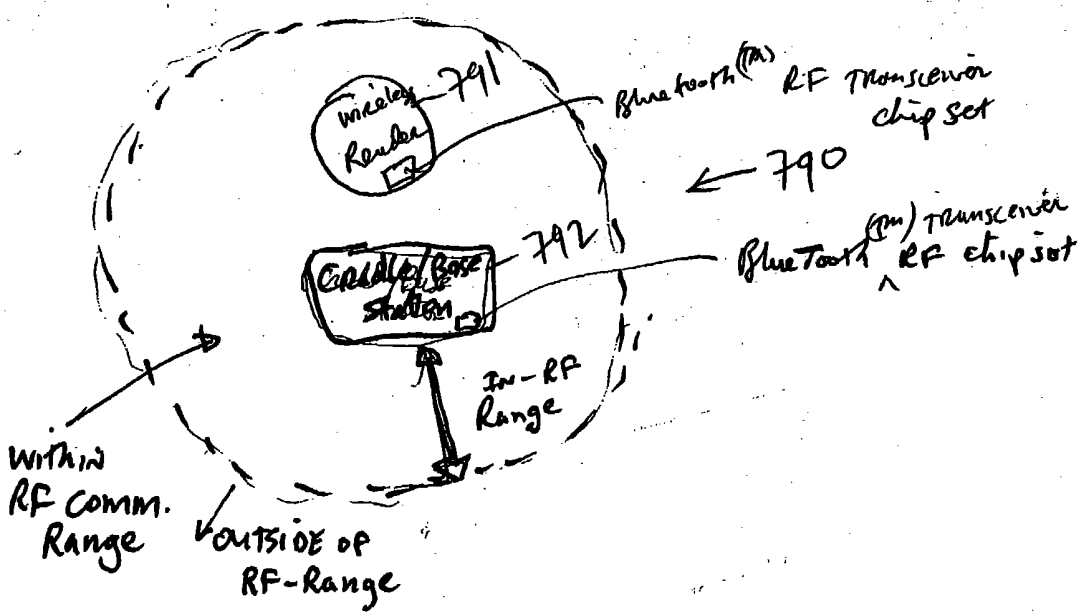


FIG. 44A2

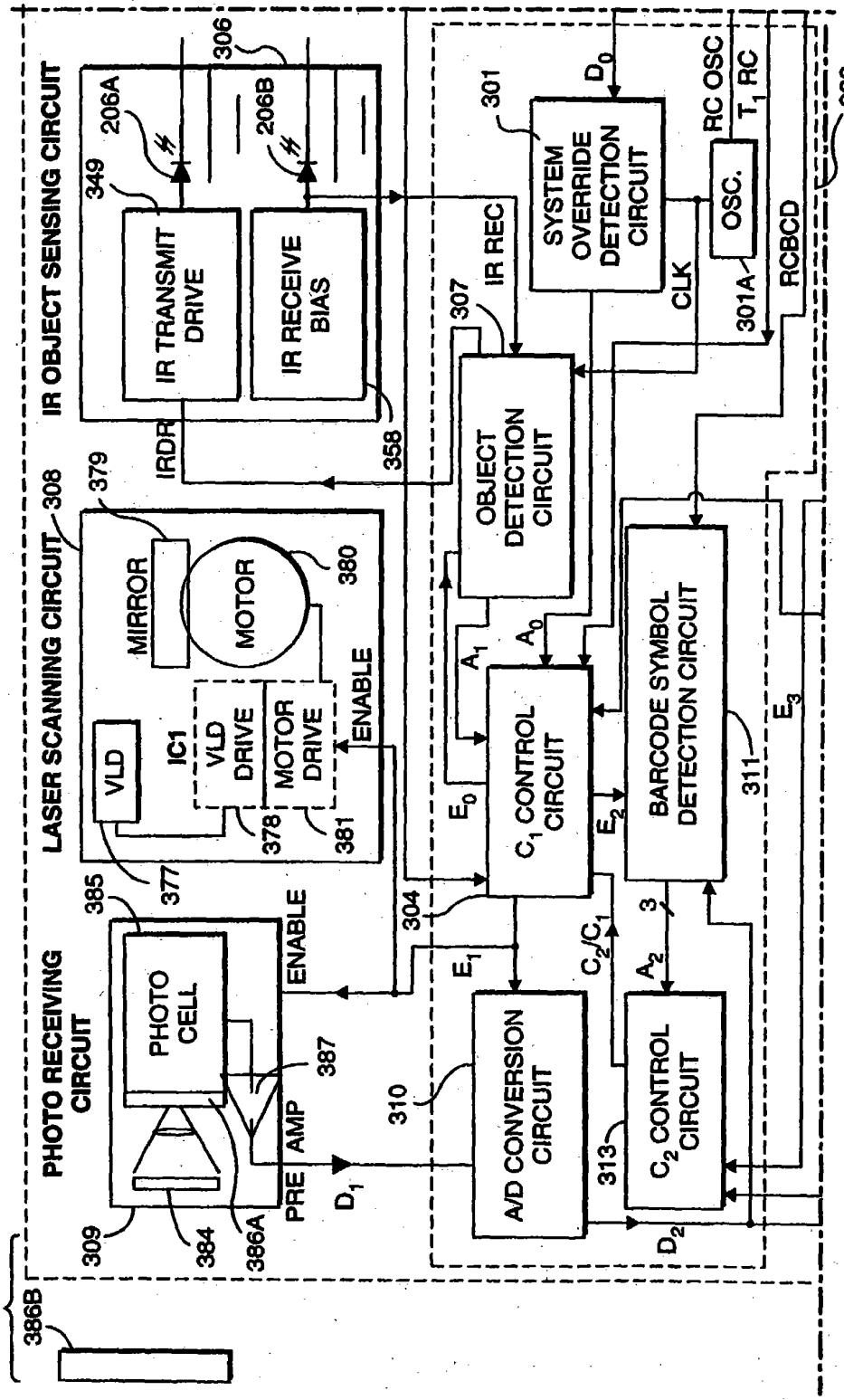

IR OBJECT SENSING CIRCUIT
LASER SCANNING CIRCUIT
PHOTO RECEIVING CIRCUIT
IR TRANSMIT DRIVE
IR RECEIVE BIAS
206A
206B
306
349
IRDR
358
IR REC
307
OBJECT DETECTION CIRCUIT
SYSTEM OVERRIDE DETECTION CIRCUIT
301
D_0
CLK
OSC.
RC OSC
T_1 RC
301A
RCBCD
333
MIRROR
MOTOR
379
380
308
VLD
IC1
VLD DRIVE
MOTOR DRIVE
ENABLE
378
381
377
385
PHOTO CELL
ENABLE
387
PRE
AMP
309
384
386A
386B
D_1
310
A/D CONVERSION CIRCUIT
E_1
304
E_0
A_1
A_0
C_1 CONTROL CIRCUIT
E_2
BARCODE SYMBOL DETECTION CIRCUIT
311
E_3
C_2/C_1
A_2
3
313
C_2 CONTROL CIRCUIT
D_2

FIG 45A1

790

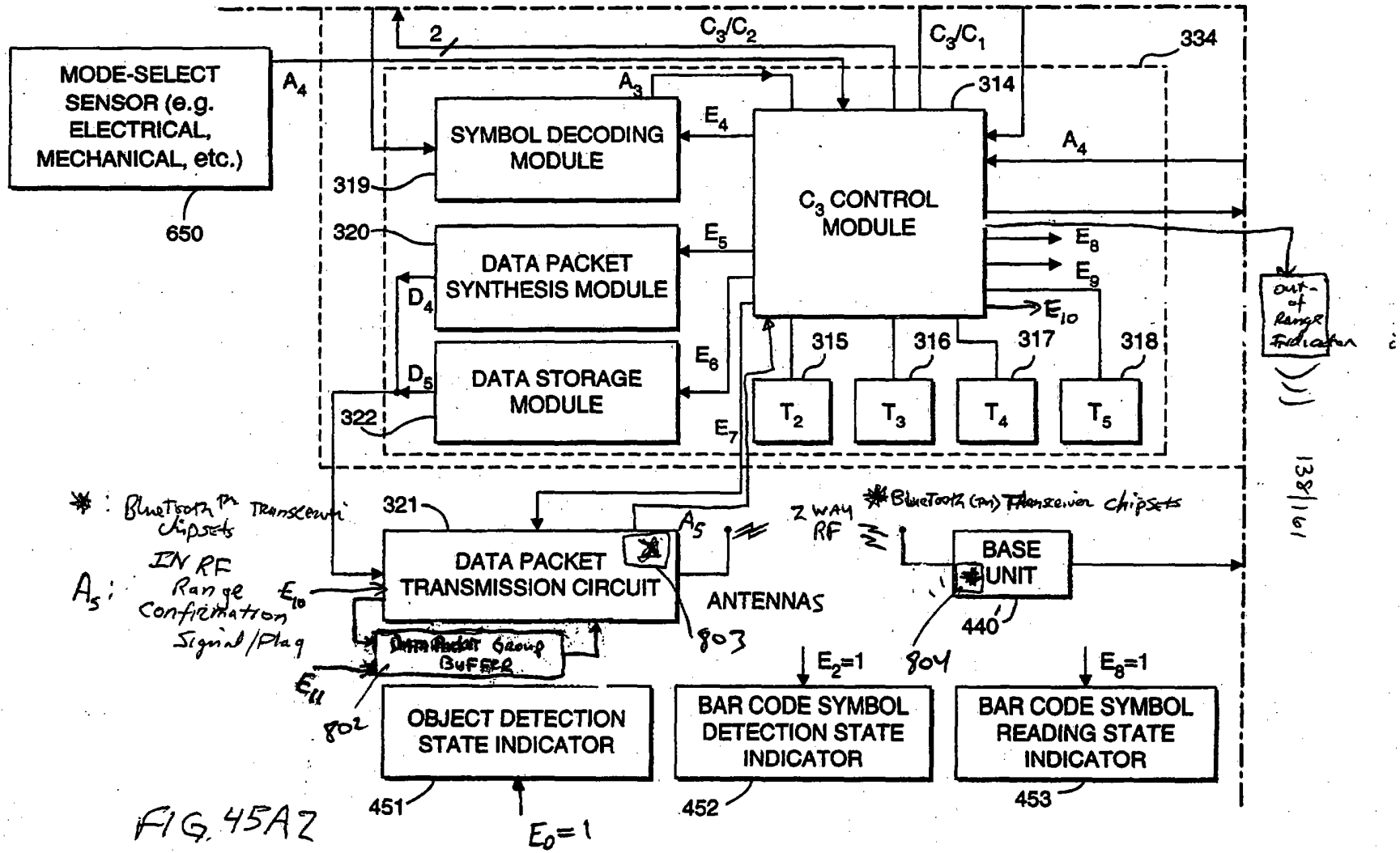

MODE-SELECT SENSOR (e.g. ELECTRICAL, MECHANICAL, etc.)
650
A_4
2
C_3/C_2
C_3/C_1
334
A_3
314
SYMBOL DECODING MODULE
319
E_4
C_3 CONTROL MODULE
A_4
320
DATA PACKET SYNTHESIS MODULE
E_5
D_4
E_8
E_9
E_{10}
DATA STORAGE MODULE
D_5
E_6
322
E_7
315
316
317
318
T_2
T_3
T_4
T_5
out-of range indicator
138/161
* : BlueTooth™ Transceiver Chipsets
321
DATA PACKET TRANSMISSION CIRCUIT
A_5
2 WAY RF
* BlueTooth (TM) Transceiver chipsets
BASE UNIT
440
ANTENNAS
803
804
A_5: IN RF Range Confirmation Signal/Flag
E_{10}
Data Packet Group Buffer
E_{11}
802
E_2=1
E_8=1
OBJECT DETECTION STATE INDICATOR
BAR CODE SYMBOL DETECTION STATE INDICATOR
BAR CODE SYMBOL READING STATE INDICATOR
451
452
453
E_0=1

FIG. 45A2

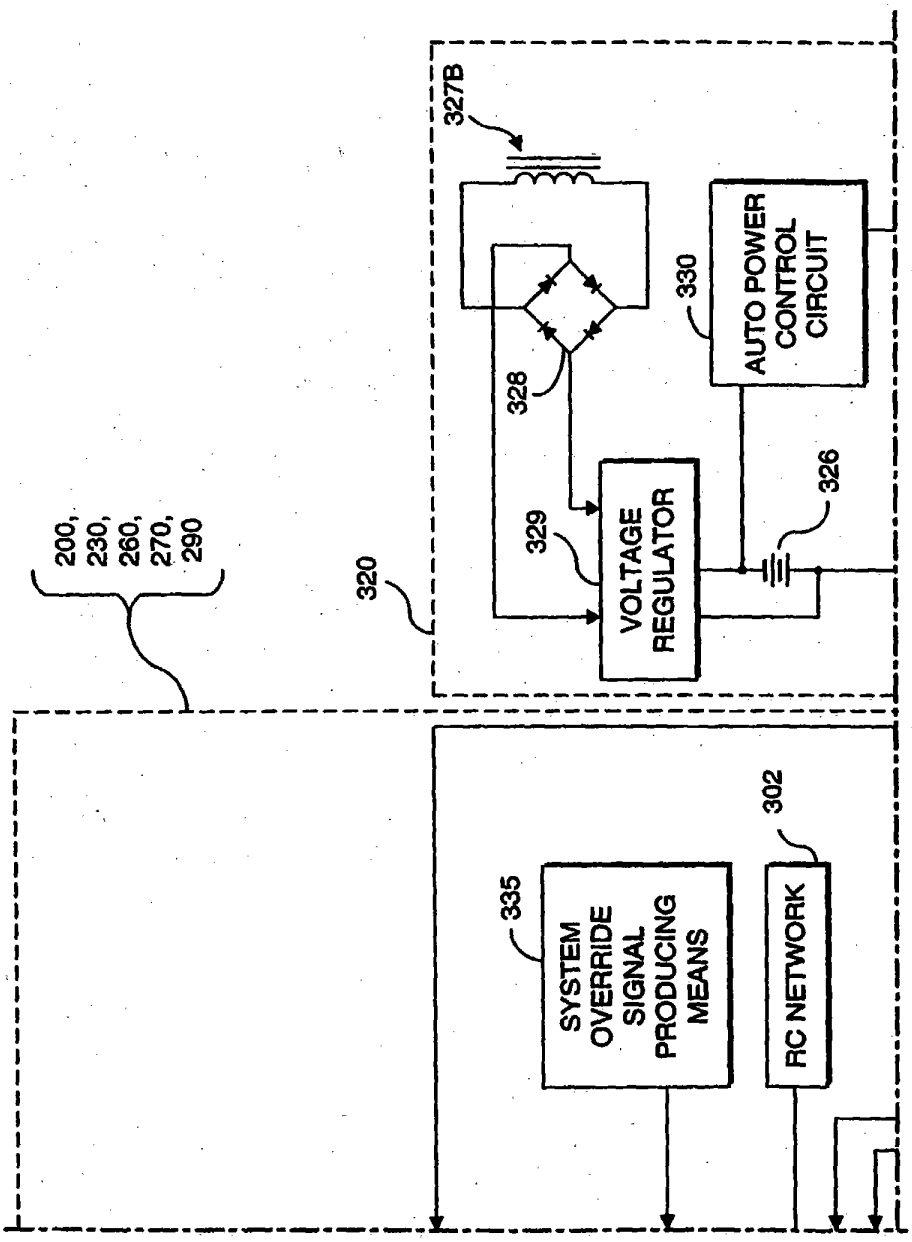

200,
230,
260,
270,
290
320
327B
328
329
326
330
AUTO POWER
CONTROL
CIRCUIT
VOLTAGE
REGULATOR
335
SYSTEM
OVERRIDE
SIGNAL
PRODUCING
MEANS
302
RC NETWORK

FIG. 45A3

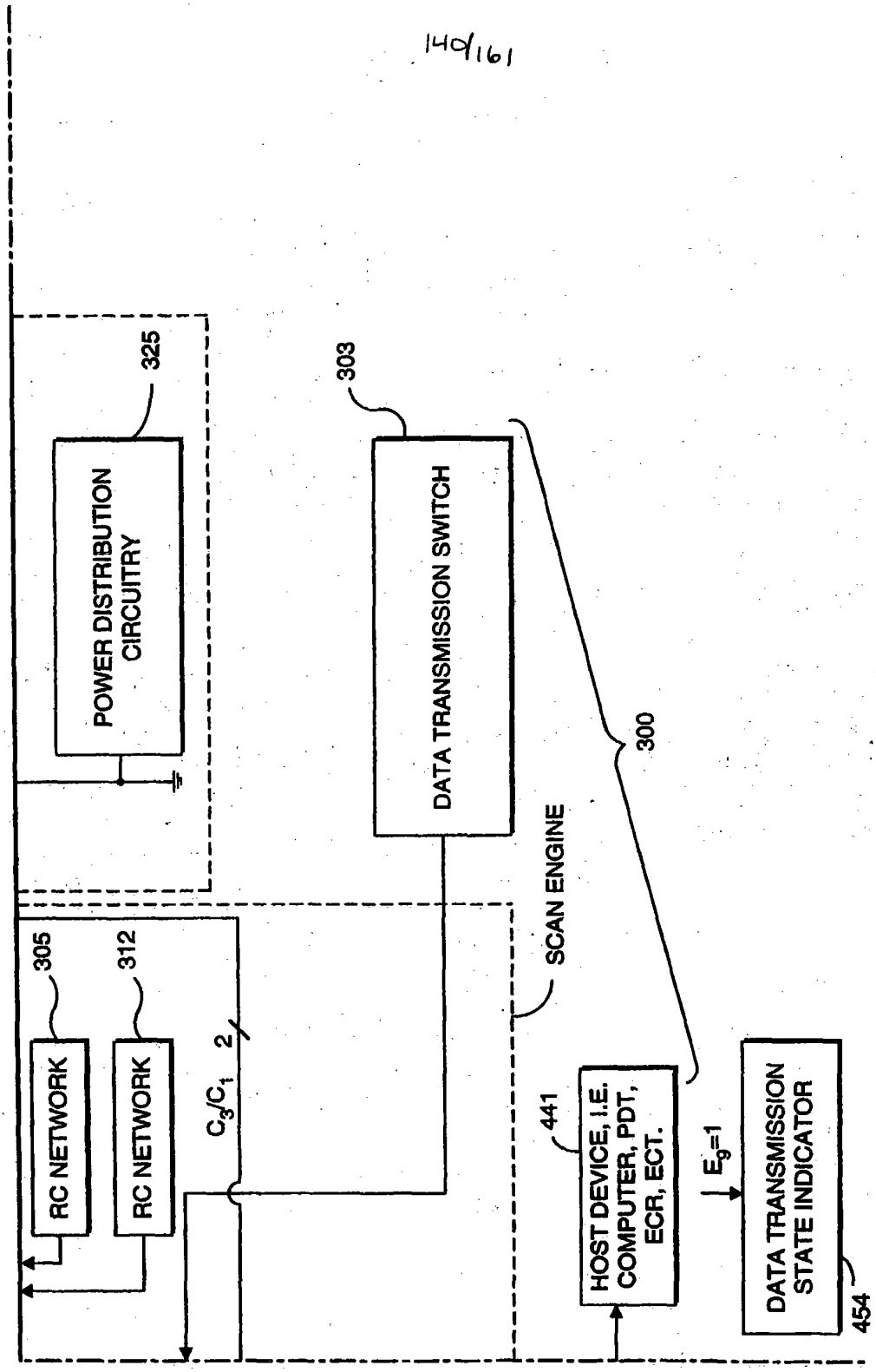

325
POWER DISTRIBUTION CIRCUITRY
303
DATA TRANSMISSION SWITCH
300
SCAN ENGINE
305
RC NETWORK
312
RC NETWORK
C_3/C_1 2
441
HOST DEVICE, I.E. COMPUTER, PDT, ECR, ECT.
E_g=1
DATA TRANSMISSION STATE INDICATOR
454

FIG 45A4

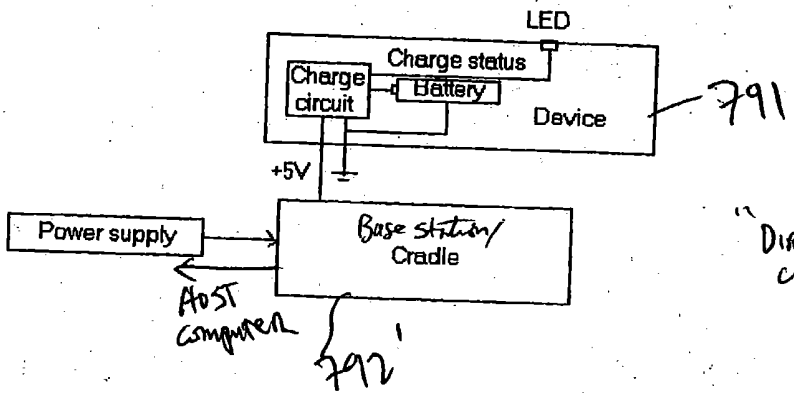

LED
Charge status
Charge circuit
Battery
Device
791
+5V
Power supply
Base station/ Cradle
AUST computer
792'
"Direct-Contact" charge Technique

FIG. 45B

DATA Packet Transmission VIA 2-WAY RF WITH Automatic RF-Range Dependent Control

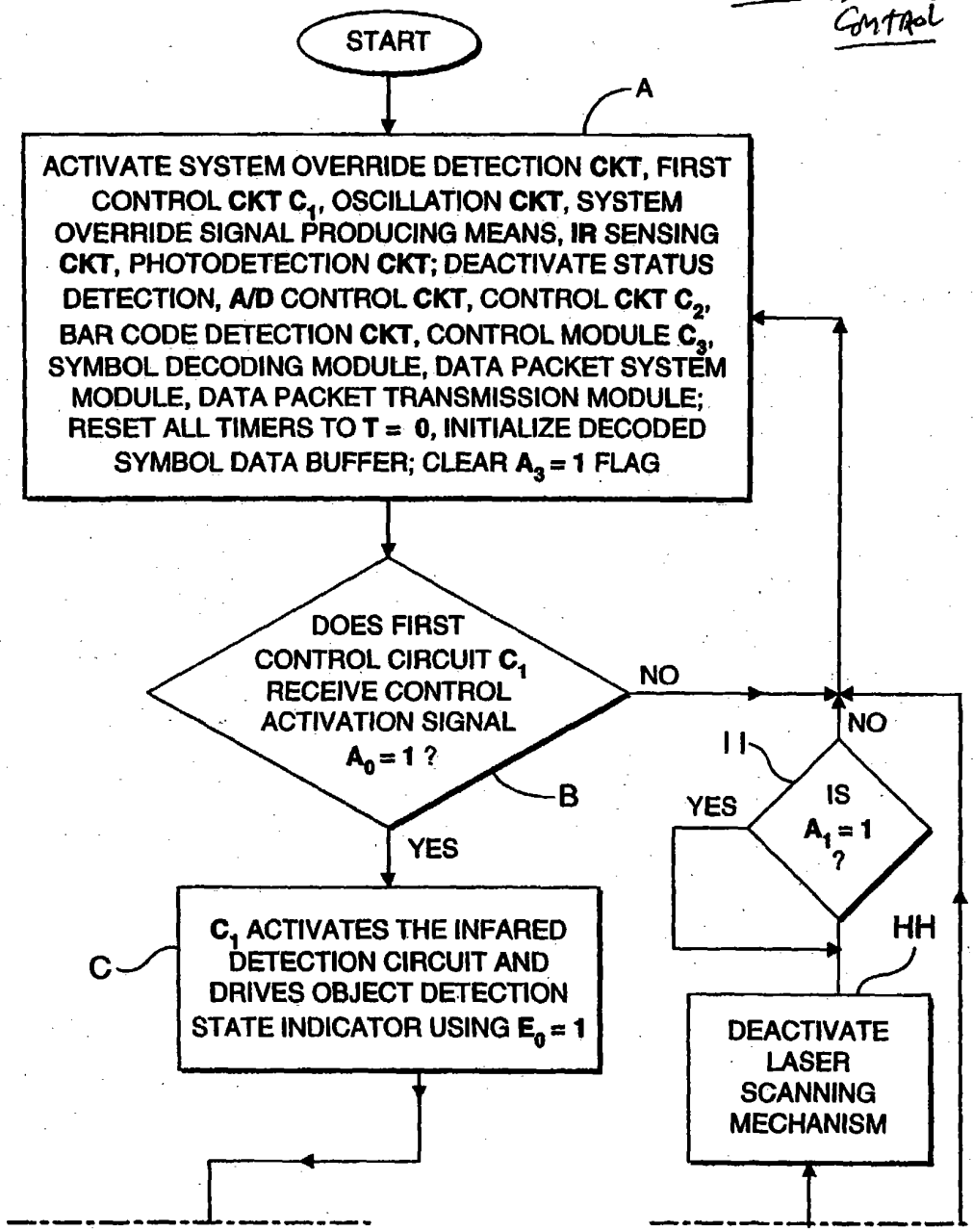


FIG.46A1

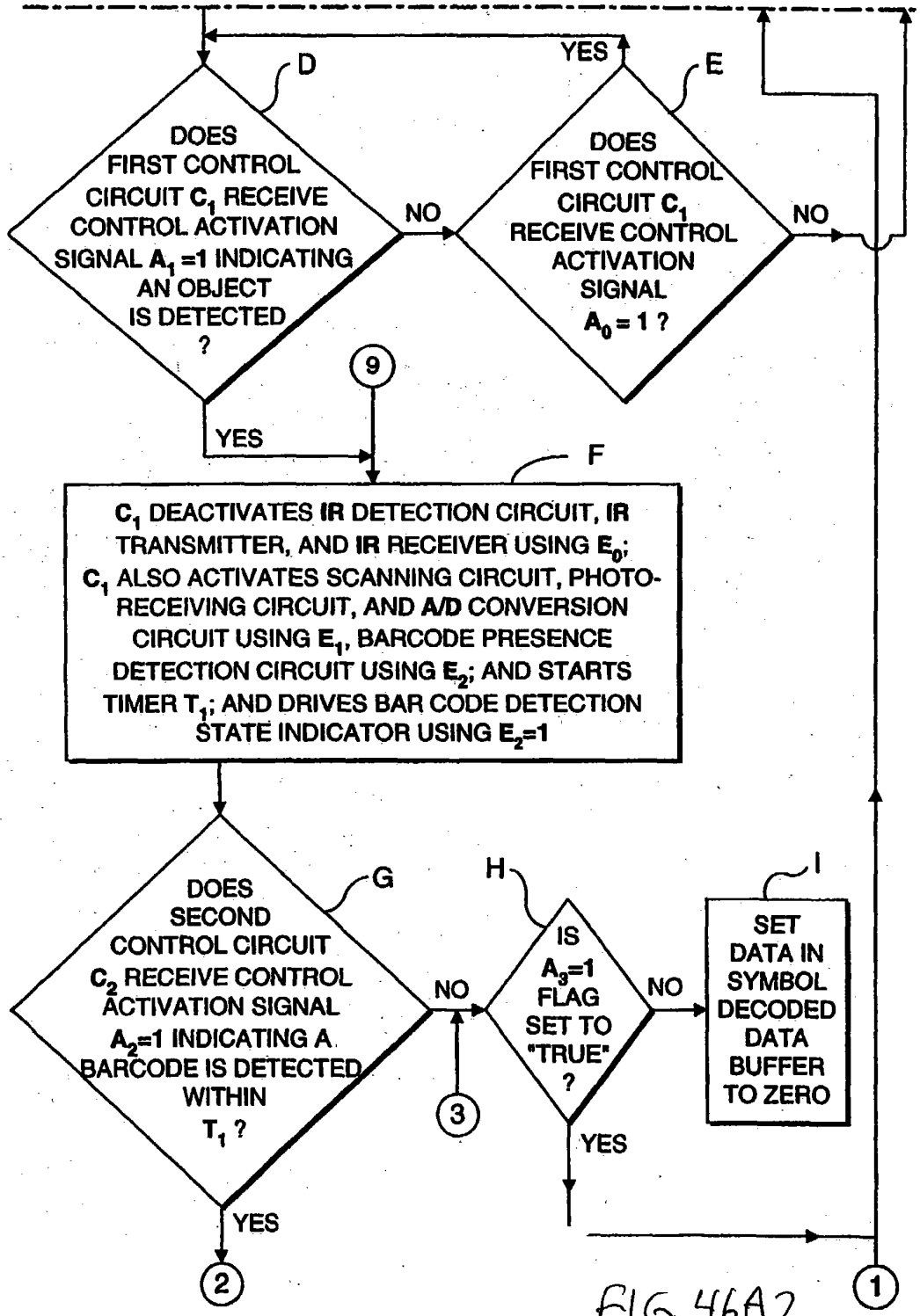

D
DOES FIRST CONTROL CIRCUIT C_1 RECEIVE CONTROL ACTIVATION SIGNAL A_1 =1 INDICATING AN OBJECT IS DETECTED ?
NO
YES
E
DOES FIRST CONTROL CIRCUIT C_1 RECEIVE CONTROL ACTIVATION SIGNAL A_0 = 1 ?
NO
YES
9
F
C_1 DEACTIVATES IR DETECTION CIRCUIT, IR TRANSMITTER, AND IR RECEIVER USING E_0; C_1 ALSO ACTIVATES SCANNING CIRCUIT, PHOTO-RECEIVING CIRCUIT, AND A/D CONVERSION CIRCUIT USING E_1, BARCODE PRESENCE DETECTION CIRCUIT USING E_2; AND STARTS TIMER T_1; AND DRIVES BAR CODE DETECTION STATE INDICATOR USING E_2=1
G
DOES SECOND CONTROL CIRCUIT C_2 RECEIVE CONTROL ACTIVATION SIGNAL A_2=1 INDICATING A BARCODE IS DETECTED WITHIN T_1 ?
NO
YES
H
IS A_3=1 FLAG SET TO "TRUE" ?
NO
YES
I
SET DATA IN SYMBOL DECODED DATA BUFFER TO ZERO
3
2
1

FIG 46A2

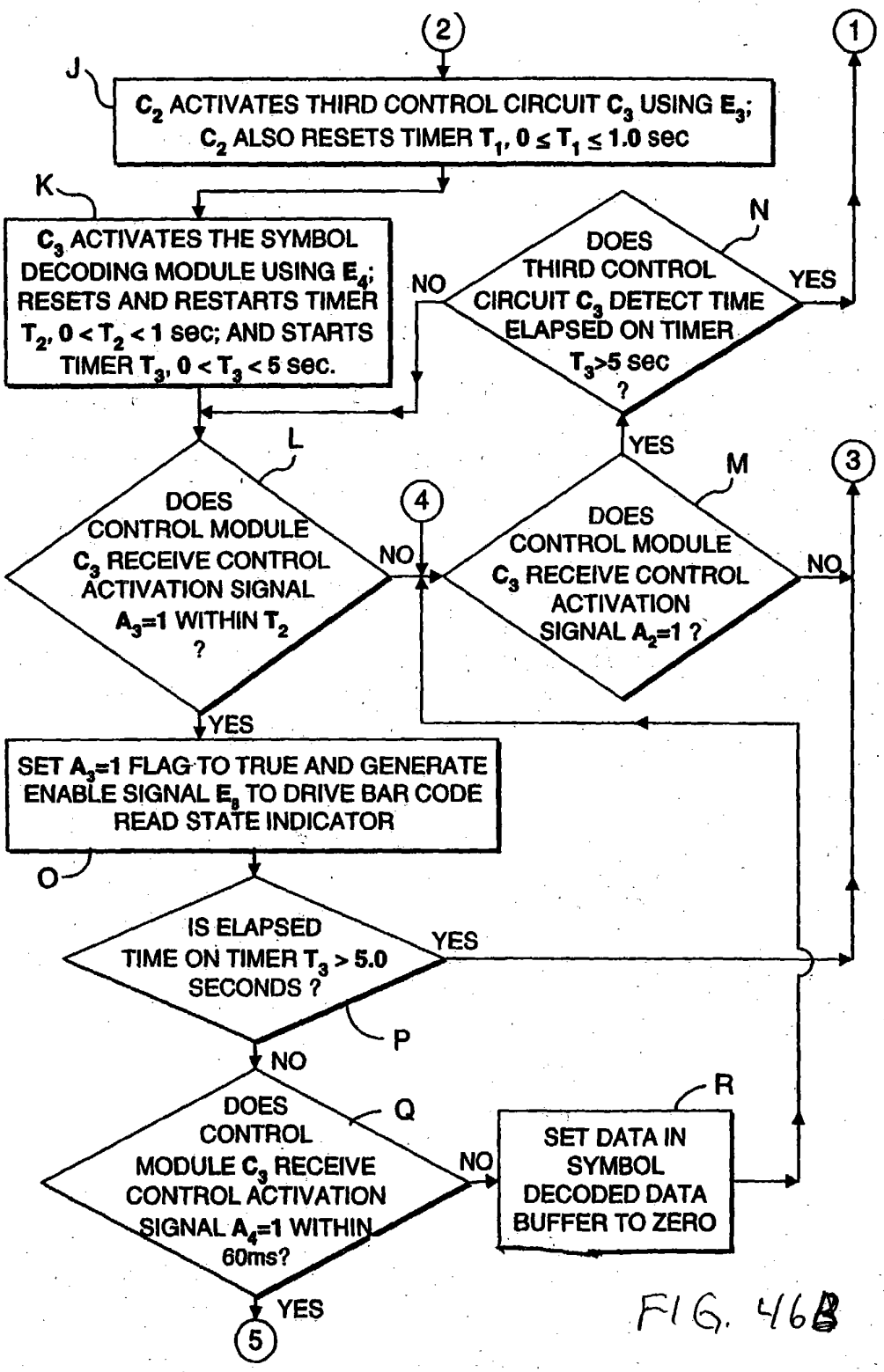

2
1
J
C_2 ACTIVATES THIRD CONTROL CIRCUIT C_3 USING E_3; C_2 ALSO RESETS TIMER T_1, $0 \le T_1 \le 1.0$ sec
K
C_3 ACTIVATES THE SYMBOL DECODING MODULE USING E_4; RESETS AND RESTARTS TIMER T_2, $0 < T_2 < 1$ sec; AND STARTS TIMER T_3, $0 < T_3 < 5$ sec.
N
DOES THIRD CONTROL CIRCUIT C_3 DETECT TIME ELAPSED ON TIMER T_3>5 sec ?
NO
YES
YES
L
M
3
4
DOES CONTROL MODULE C_3 RECEIVE CONTROL ACTIVATION SIGNAL A_3=1 WITHIN T_2 ?
NO
DOES CONTROL MODULE C_3 RECEIVE CONTROL ACTIVATION SIGNAL A_2=1 ?
NO
YES
SET A_3=1 FLAG TO TRUE AND GENERATE ENABLE SIGNAL E_8 TO DRIVE BAR CODE READ STATE INDICATOR
O
IS ELAPSED TIME ON TIMER T_3 > 5.0 SECONDS ?
YES
P
NO
DOES CONTROL MODULE C_3 RECEIVE CONTROL ACTIVATION SIGNAL A_4=1 WITHIN 60ms?
Q
NO
R
SET DATA IN SYMBOL DECODED DATA BUFFER TO ZERO
YES
5

FIG. 46B

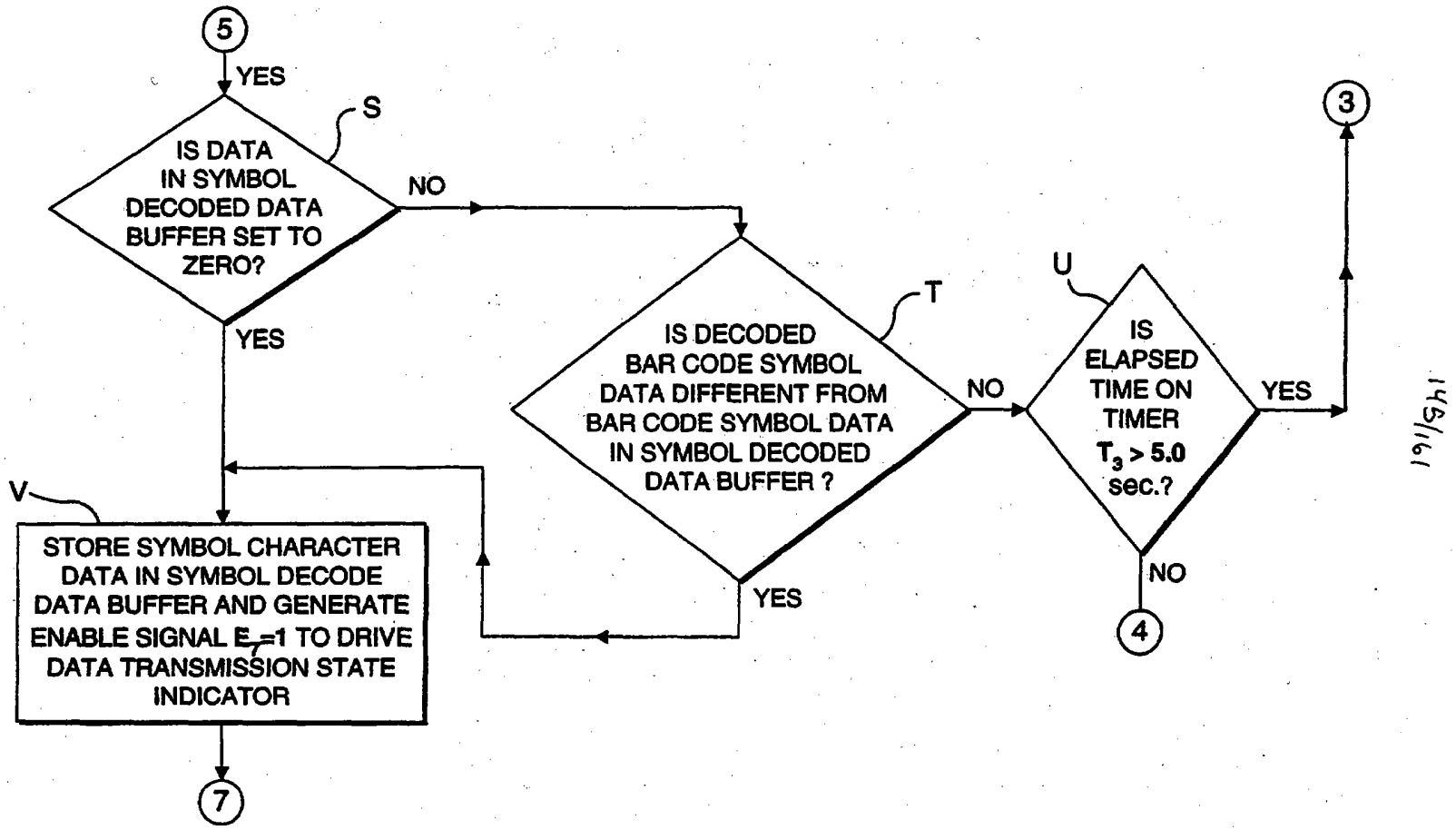

5
YES
S
IS DATA IN SYMBOL DECODED DATA BUFFER SET TO ZERO?
NO
YES
T
IS DECODED BAR CODE SYMBOL DATA DIFFERENT FROM BAR CODE SYMBOL DATA IN SYMBOL DECODED DATA BUFFER ?
NO
U
IS ELAPSED TIME ON TIMER $T_3 > 5.0$ sec.?
YES
3
NO
4
YES
V
STORE SYMBOL CHARACTER DATA IN SYMBOL DECODE DATA BUFFER AND GENERATE ENABLE SIGNAL E_7=1 TO DRIVE DATA TRANSMISSION STATE INDICATOR
7

FIG 46C1

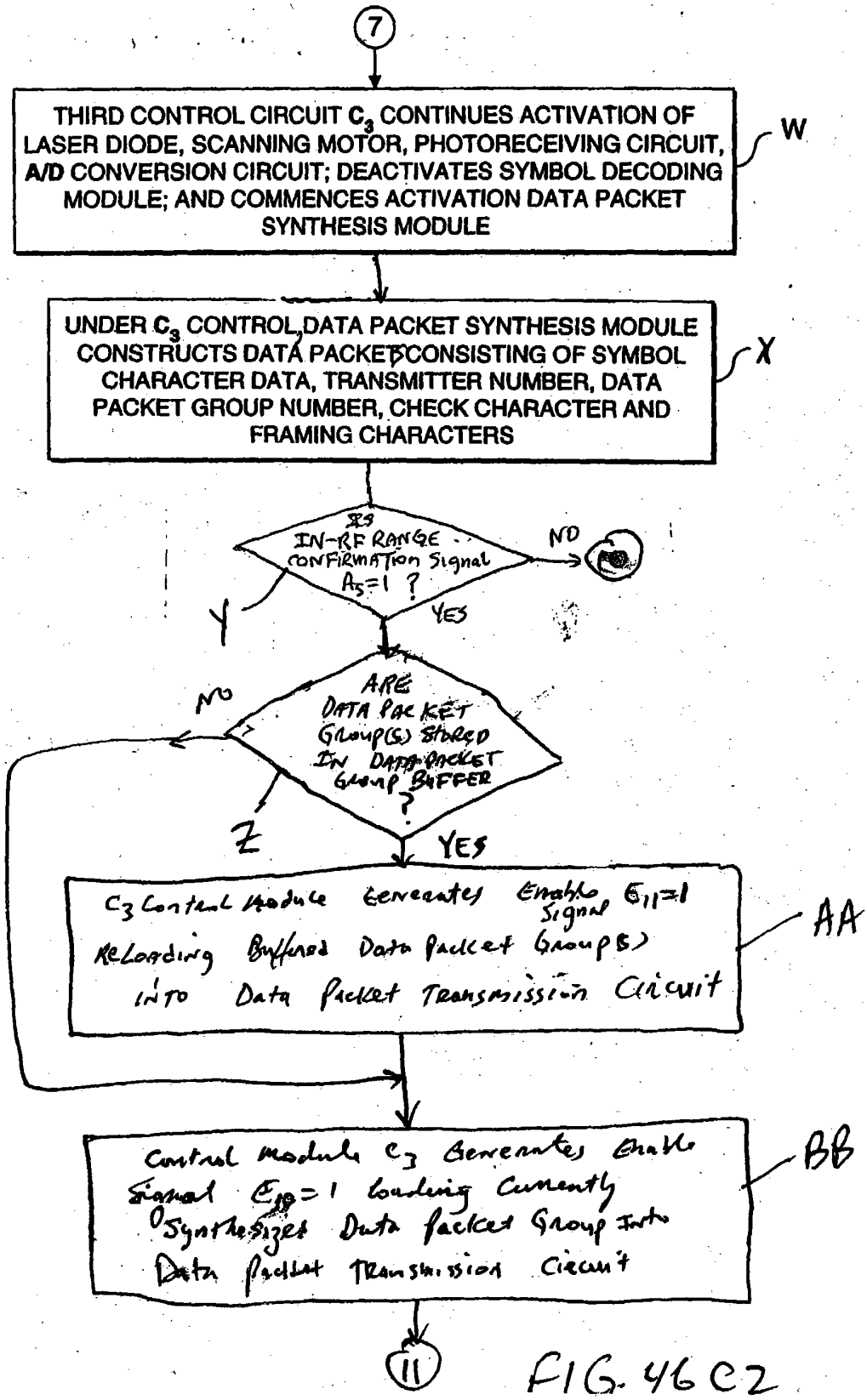

7
THIRD CONTROL CIRCUIT C_3 CONTINUES ACTIVATION OF LASER DIODE, SCANNING MOTOR, PHOTORECEIVING CIRCUIT, A/D CONVERSION CIRCUIT; DEACTIVATES SYMBOL DECODING MODULE; AND COMMENCES ACTIVATION DATA PACKET SYNTHESIS MODULE
W
UNDER C_3 CONTROL, DATA PACKET SYNTHESIS MODULE CONSTRUCTS DATA PACKETS CONSISTING OF SYMBOL CHARACTER DATA, TRANSMITTER NUMBER, DATA PACKET GROUP NUMBER, CHECK CHARACTER AND FRAMING CHARACTERS
X
IS IN-RF RANGE CONFIRMATION Signal A_5=1 ?
NO
YES
Y
ARE DATA PACKET GROUP(S) STORED IN DATA PACKET GROUP BUFFER ?
NO
YES
Z
C_3 Control Module Generates Enable Signal E_{11}=1 ReLoading Buffered Data Packet Group(s) into Data Packet Transmission Circuit
AA
Control module C_3 Generates Enable Signal E_{10}=1 loading Currently Synthesized Data Packet Group into Data Packet Transmission Circuit
BB
11

FIG. 46C2

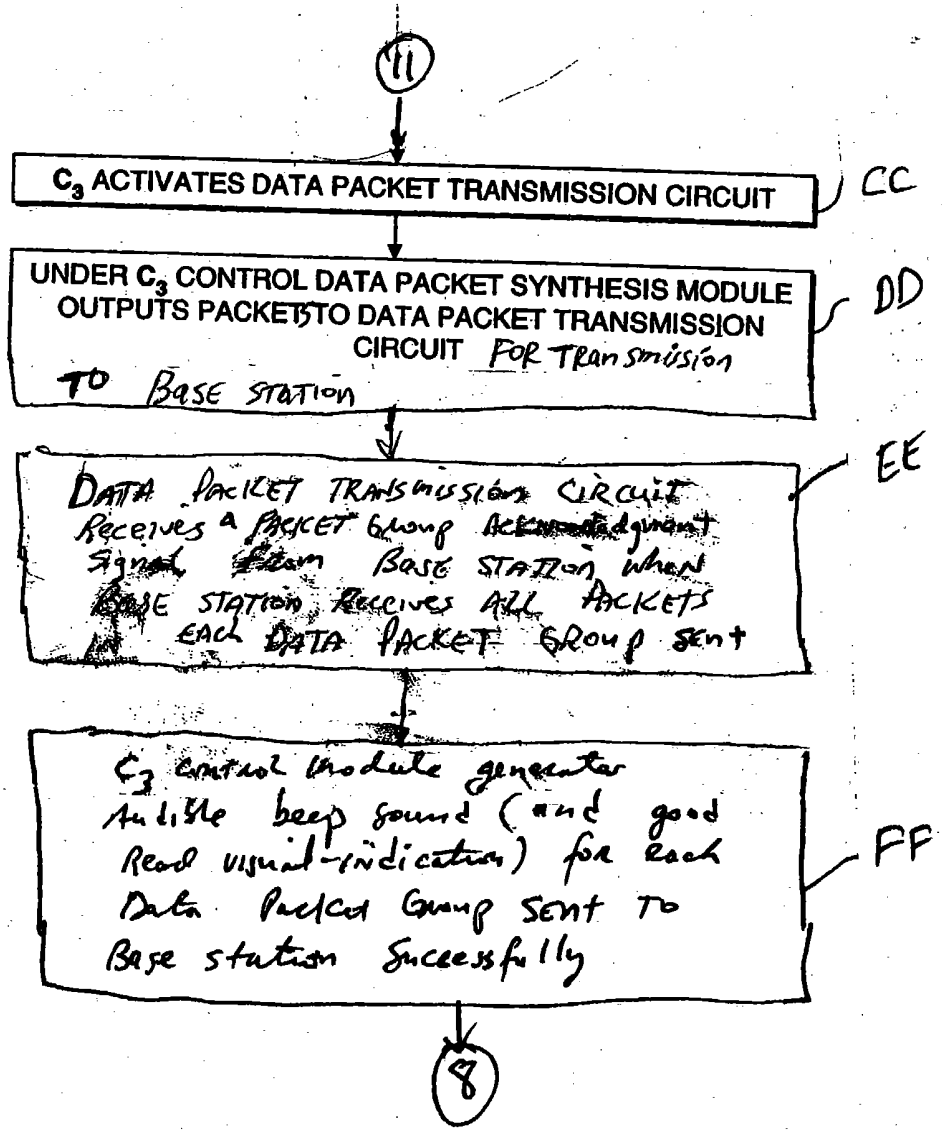

11
C_3 ACTIVATES DATA PACKET TRANSMISSION CIRCUIT
CC
UNDER C_3 CONTROL DATA PACKET SYNTHESIS MODULE OUTPUTS PACKETS TO DATA PACKET TRANSMISSION CIRCUIT FOR TRANSMISSION TO BASE STATION
DD
DATA PACKET TRANSMISSION CIRCUIT RECEIVES A PACKET GROUP ACKNOWLEDGMENT SIGNAL FROM BASE STATION WHEN BASE STATION RECEIVES ALL PACKETS OF EACH DATA PACKET GROUP SENT
EE
C_3 CONTROL MODULE GENERATES AUDIBLE BEEP SOUND (AND GOOD READ VISUAL-INDICATION) FOR EACH DATA PACKET GROUP SENT TO BASE STATION SUCCESSFULLY
FF
8

FIG. 46C3

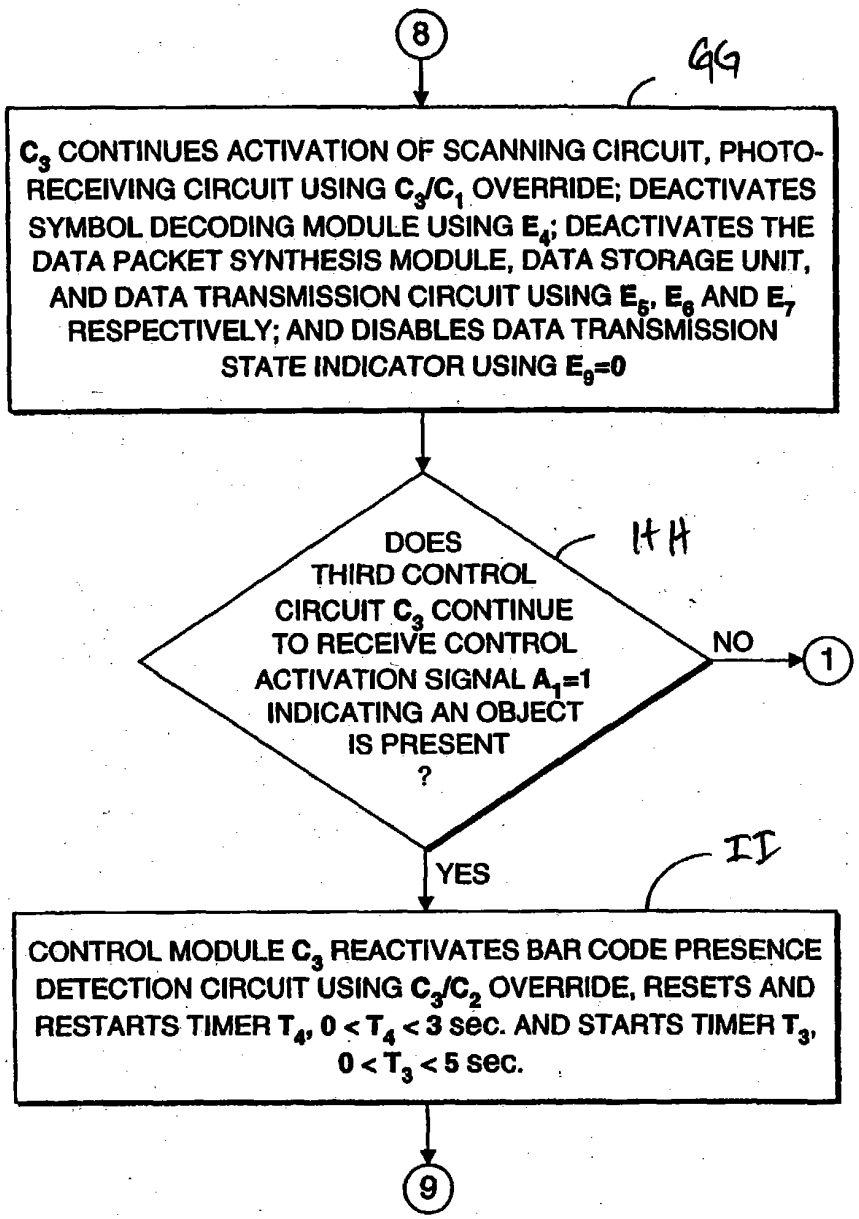

8
GG
C_3 CONTINUES ACTIVATION OF SCANNING CIRCUIT, PHOTO-RECEIVING CIRCUIT USING C_3/C_1 OVERRIDE; DEACTIVATES SYMBOL DECODING MODULE USING E_4; DEACTIVATES THE DATA PACKET SYNTHESIS MODULE, DATA STORAGE UNIT, AND DATA TRANSMISSION CIRCUIT USING E_5, E_6 AND E_7 RESPECTIVELY; AND DISABLES DATA TRANSMISSION STATE INDICATOR USING E_9=0
HH
DOES THIRD CONTROL CIRCUIT C_3 CONTINUE TO RECEIVE CONTROL ACTIVATION SIGNAL A_1=1 INDICATING AN OBJECT IS PRESENT ?
NO
1
YES
II
CONTROL MODULE C_3 REACTIVATES BAR CODE PRESENCE DETECTION CIRCUIT USING C_3/C_2 OVERRIDE, RESETS AND RESTARTS TIMER T_4, $0 < T_4 < 3$ sec. AND STARTS TIMER T_3, $0 < T_3 < 5$ sec.
9

FIG 46C4

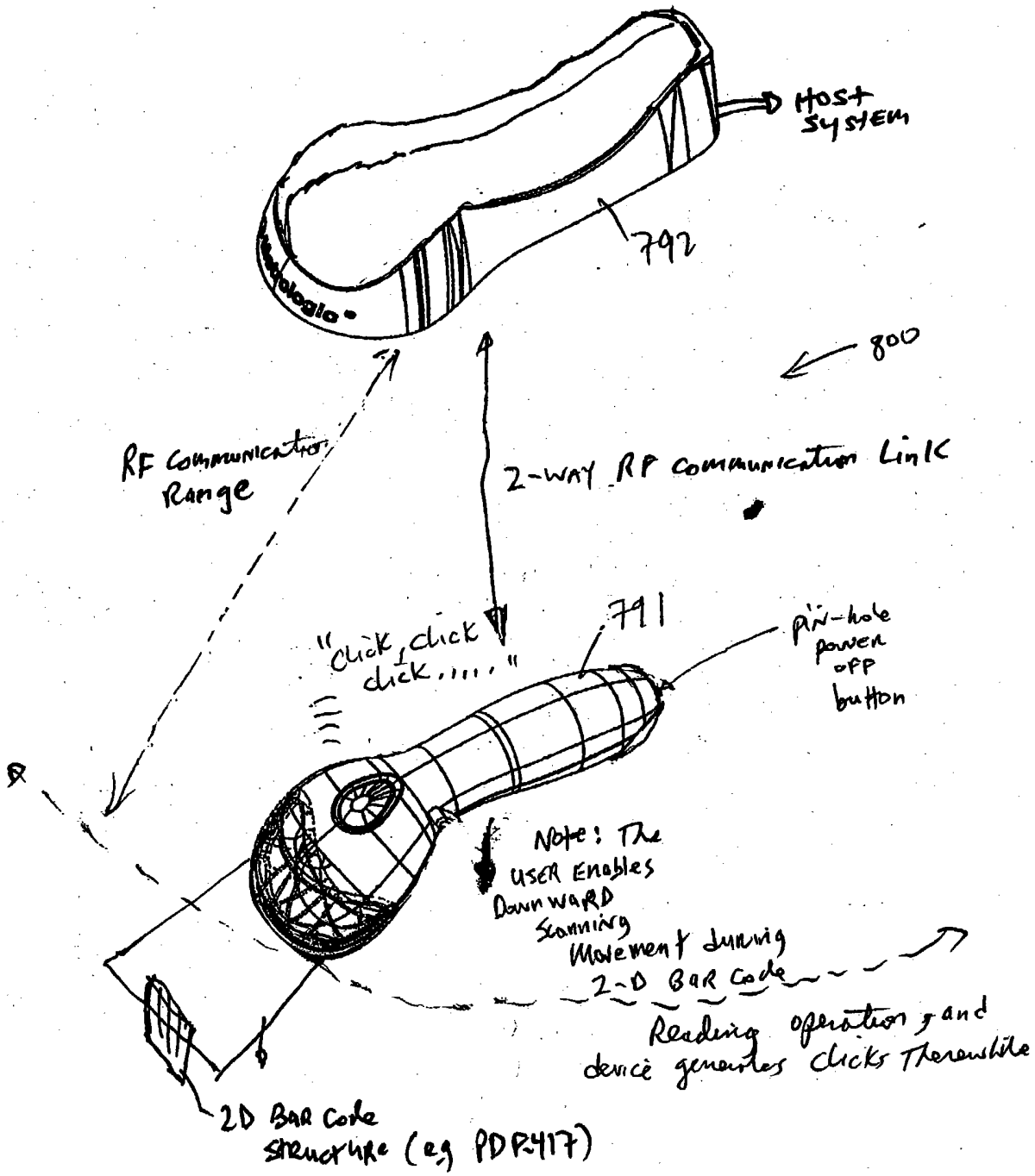

HOST SYSTEM
792
800
RF communication Range
2-WAY RF communication Link
"click, click click....."
791
Pin-hole power OFF button
Note: The USER Enables DOWNWARD Scanning Movement during 2-D BAR Code Reading operation, and device generates clicks therewhile
2D Bar Code structure (e.g. PDF417)

FIG. 47

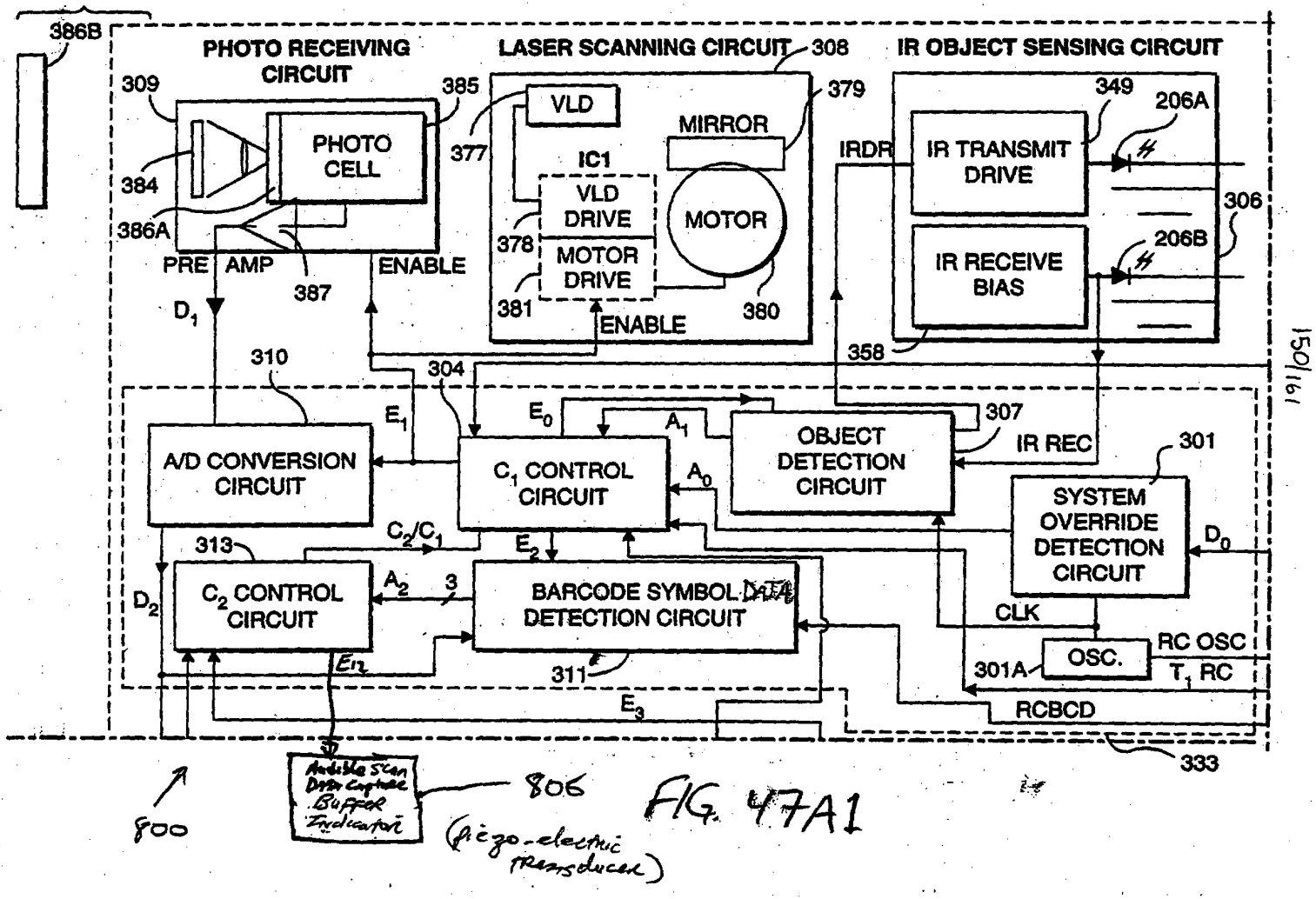

386B
PHOTO RECEIVING CIRCUIT
LASER SCANNING CIRCUIT
308
IR OBJECT SENSING CIRCUIT
309
385
PHOTO CELL
384
386A
PRE AMP
387
ENABLE
D1
377
VLD
IC1
VLD DRIVE
378
MOTOR DRIVE
381
ENABLE
MIRROR
379
MOTOR
380
IRDR
IR TRANSMIT DRIVE
349
206A
306
IR RECEIVE BIAS
206B
358
310
304
E1
E0
A1
307
IR REC
OBJECT DETECTION CIRCUIT
A/D CONVERSION CIRCUIT
C1 CONTROL CIRCUIT
A0
301
SYSTEM OVERRIDE DETECTION CIRCUIT
D0
C2/C1
313
E2
D2
C2 CONTROL CIRCUIT
A2
3
BARCODE SYMBOL DATA DETECTION CIRCUIT
CLK
RC OSC
301A
OSC.
T1 RC
311
E3
RCBCD
333
150/191
Audible Scan Data Capture Buffer Indicator
806
800
(piezo-electric transducer)

FIG. 47A1

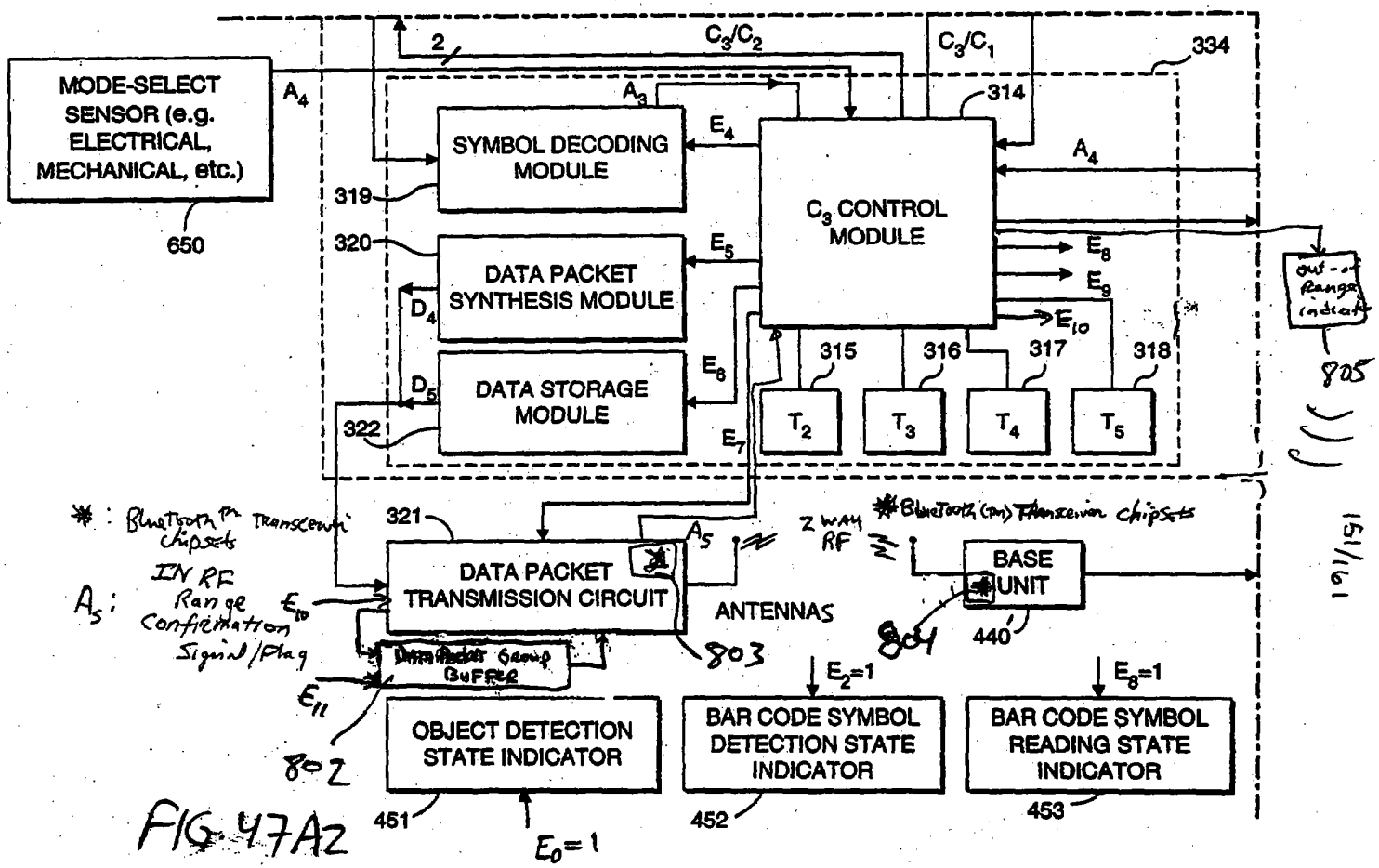

MODE-SELECT SENSOR (e.g. ELECTRICAL, MECHANICAL, etc.)
650
A_4
2
C_3/C_2
C_3/C_1
334
314
A_3
SYMBOL DECODING MODULE
319
E_4
C_3 CONTROL MODULE
A_4
320
DATA PACKET SYNTHESIS MODULE
E_5
D_4
E_8
E_9
E_{10}
DATA STORAGE MODULE
E_6
D_5
322
E_7
315
316
317
318
T_2
T_3
T_4
T_5
out-of Range indicator
805
321
A_5
DATA PACKET TRANSMISSION CIRCUIT
ANTENNAS
2 WAY RF
BASE UNIT
440
803
804
E_{10}
E_{11}
802
$E_2=1$
$E_8=1$
OBJECT DETECTION STATE INDICATOR
BAR CODE SYMBOL DETECTION STATE INDICATOR
BAR CODE SYMBOL READING STATE INDICATOR
451
452
453
$E_0=1$
151/191

FIG. 47A2

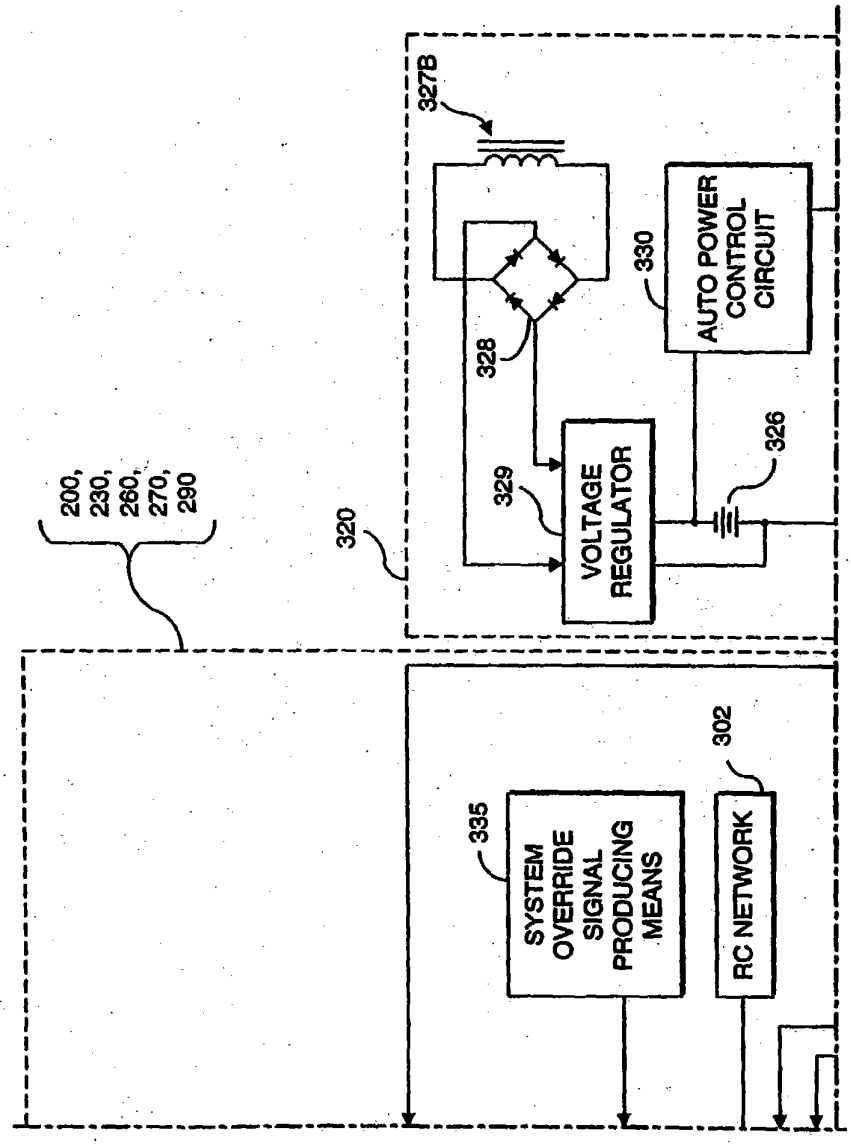

200,
230,
260,
270,
290
320
327B
328
329
VOLTAGE REGULATOR
326
330
AUTO POWER CONTROL CIRCUIT
335
SYSTEM OVERRIDE SIGNAL PRODUCING MEANS
302
RC NETWORK

FIG 47A3

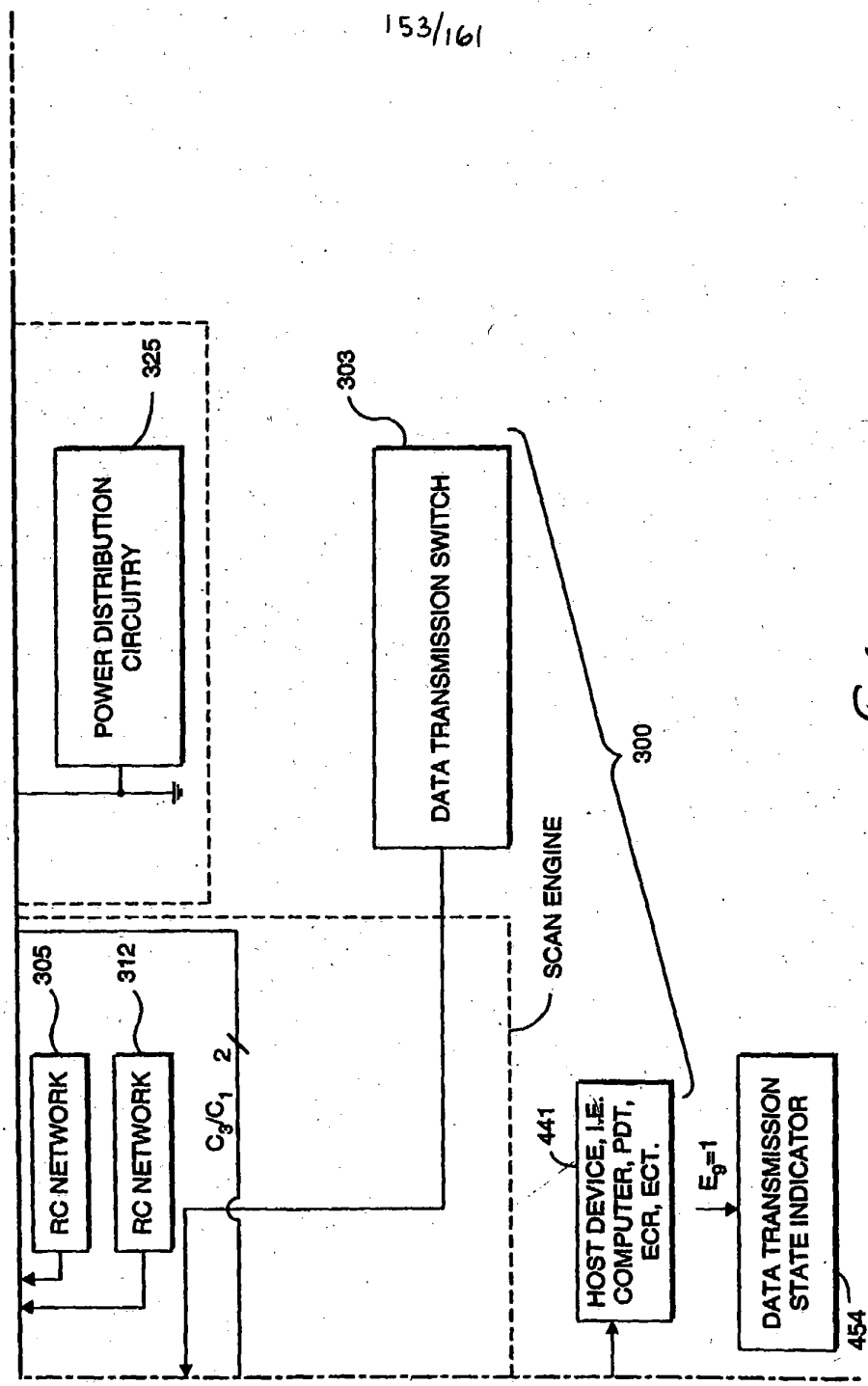

325
POWER DISTRIBUTION CIRCUITRY
303
DATA TRANSMISSION SWITCH
300
SCAN ENGINE
305
RC NETWORK
312
RC NETWORK
C_g/C_1 2
441
HOST DEVICE, I.E. COMPUTER, PDT, ECR, ECT.
E_g=1
DATA TRANSMISSION STATE INDICATOR
454

FIG. 47A4

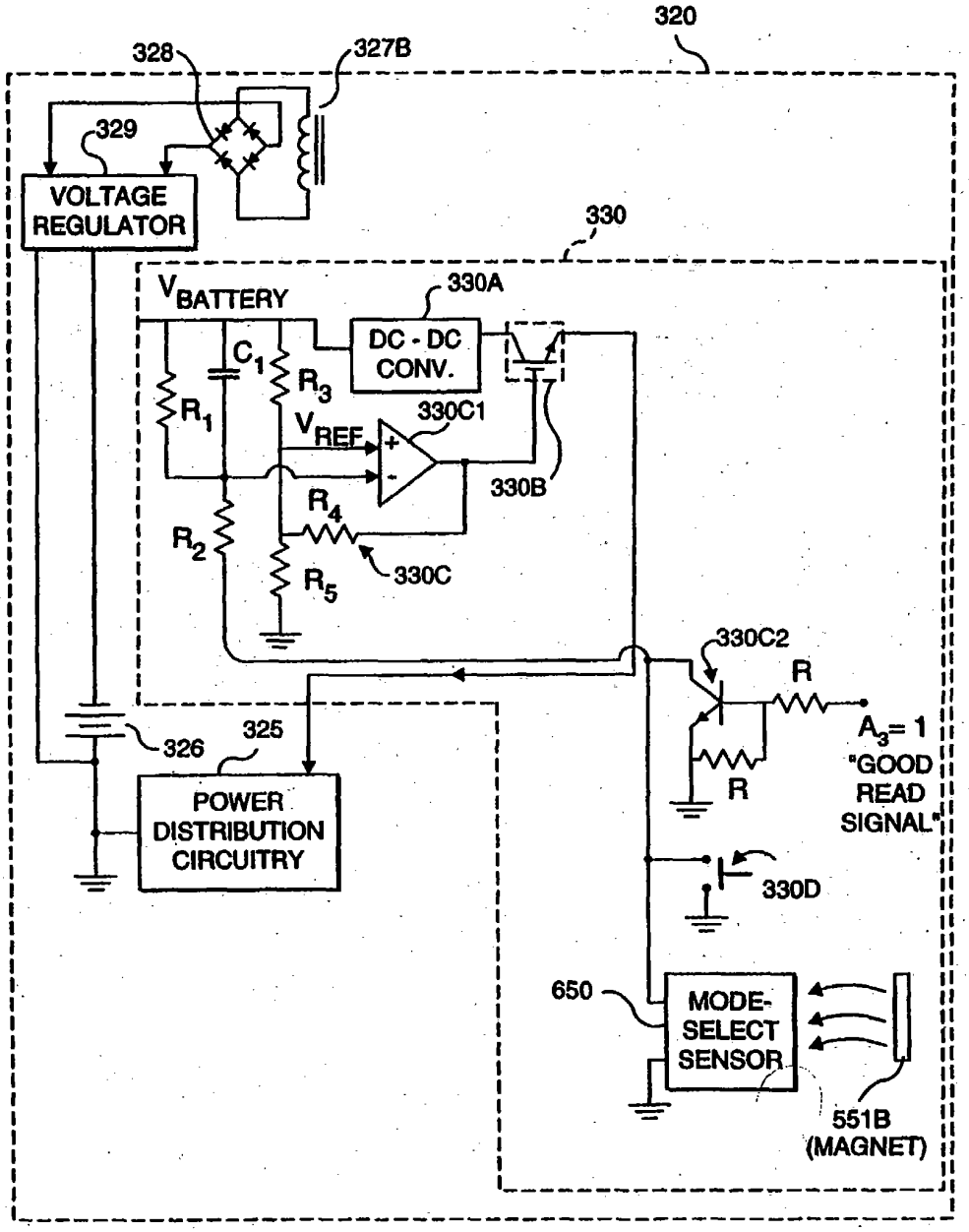

320
328
327B
329
VOLTAGE REGULATOR
330
$V_{BATTERY}$
330A
DC - DC CONV.
C_1
R_3
R_1
V_{REF}
330C1
330B
R_4
R_2
R_5
330C
330C2
R
R
A_3= 1 "GOOD READ SIGNAL"
326
325
POWER DISTRIBUTION CIRCUITRY
330D
650
MODE-SELECT SENSOR
551B (MAGNET)

FIG. 47B

PDF DATA Packet Transmission VIA 2-WAY RF With Automatic RF-Range Dependent Control

(2-D Reading mode)

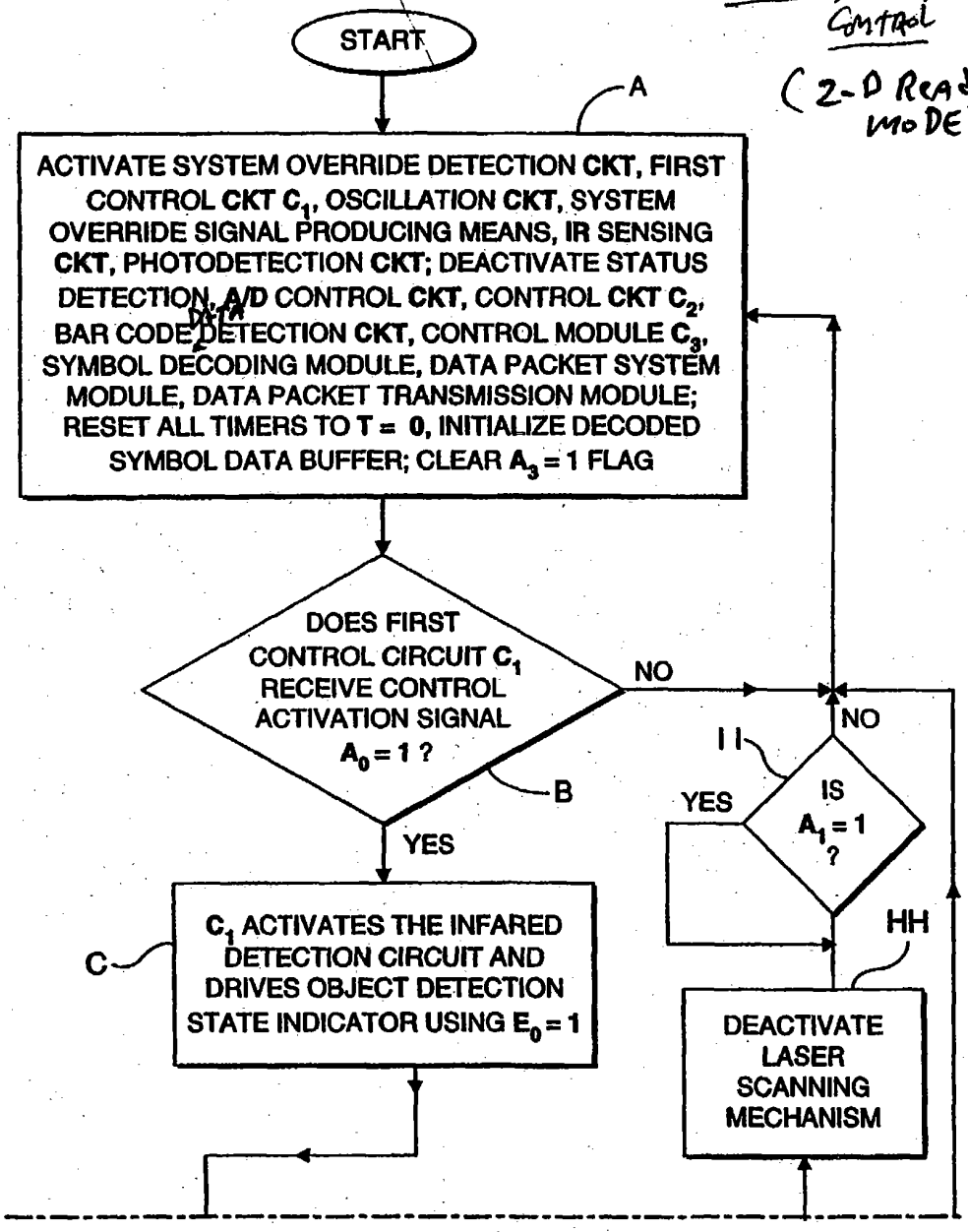


FIG. 48A1

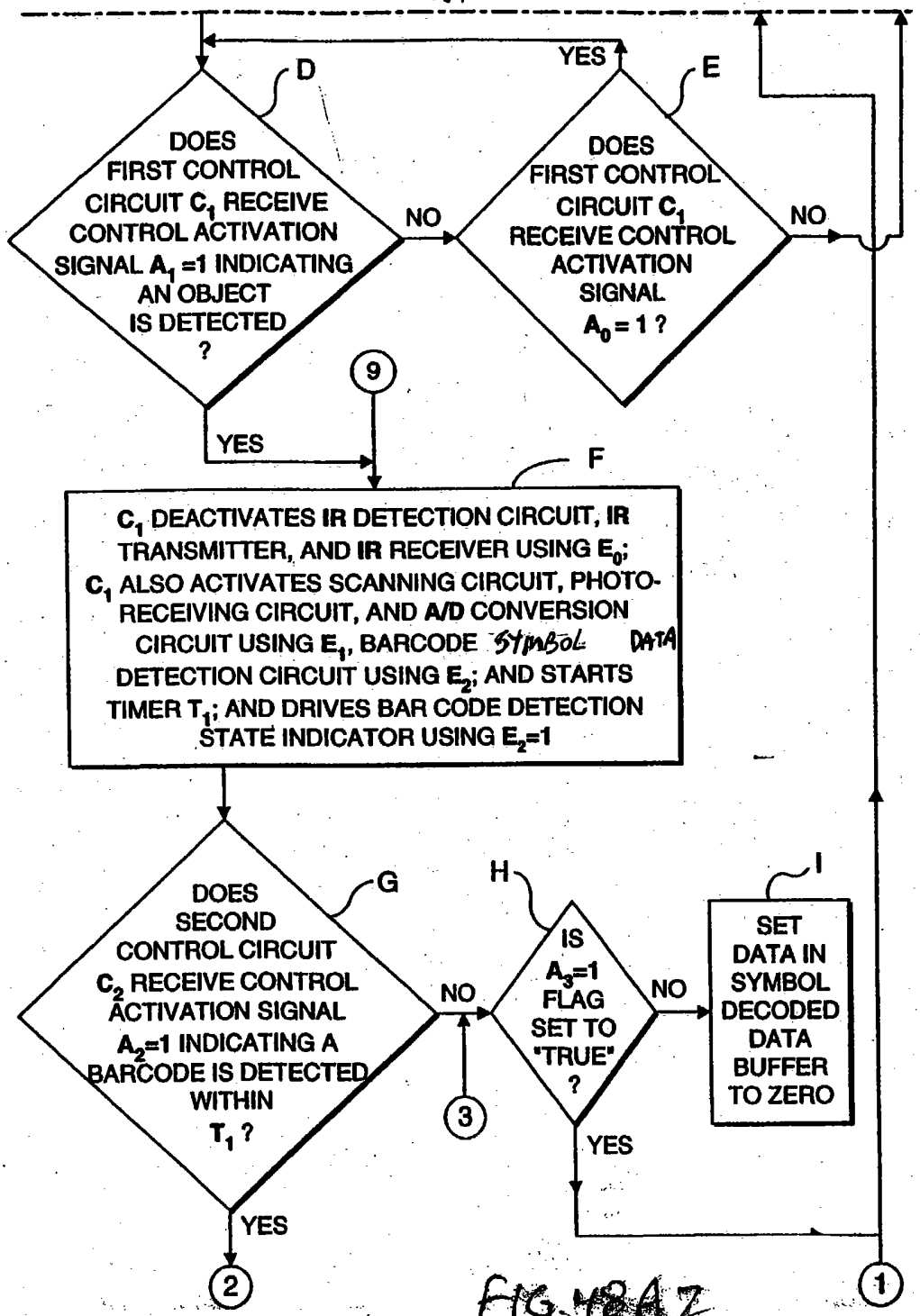

D
DOES FIRST CONTROL CIRCUIT C_1 RECEIVE CONTROL ACTIVATION SIGNAL A_1 =1 INDICATING AN OBJECT IS DETECTED ?
NO
YES
E
DOES FIRST CONTROL CIRCUIT C_1 RECEIVE CONTROL ACTIVATION SIGNAL A_0 = 1 ?
NO
YES
9
F
C_1 DEACTIVATES IR DETECTION CIRCUIT, IR TRANSMITTER, AND IR RECEIVER USING E_0; C_1 ALSO ACTIVATES SCANNING CIRCUIT, PHOTO-RECEIVING CIRCUIT, AND A/D CONVERSION CIRCUIT USING E_1, BARCODE SYMBOL DATA DETECTION CIRCUIT USING E_2; AND STARTS TIMER T_1; AND DRIVES BAR CODE DETECTION STATE INDICATOR USING E_2=1
G
DOES SECOND CONTROL CIRCUIT C_2 RECEIVE CONTROL ACTIVATION SIGNAL A_2=1 INDICATING A BARCODE IS DETECTED WITHIN T_1 ?
NO
YES
H
IS A_3=1 FLAG SET TO "TRUE" ?
NO
YES
I
SET DATA IN SYMBOL DECODED DATA BUFFER TO ZERO
3
2
1

FIG. 12A2

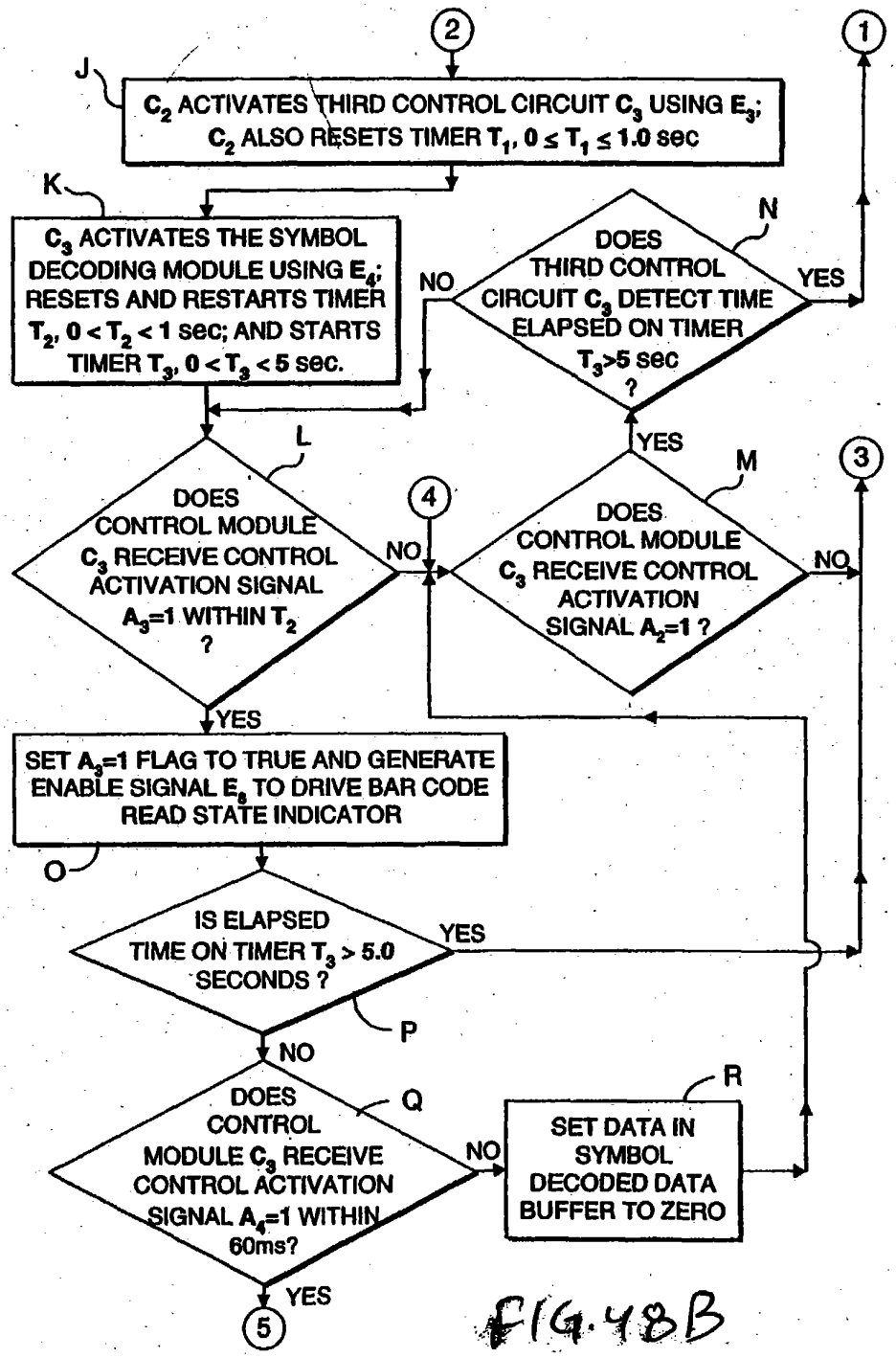

2
1
J
C_2 ACTIVATES THIRD CONTROL CIRCUIT C_3 USING E_3; C_2 ALSO RESETS TIMER T_1, $0 \leq T_1 \leq 1.0$ sec
K
C_3 ACTIVATES THE SYMBOL DECODING MODULE USING E_4; RESETS AND RESTARTS TIMER T_2, $0 < T_2 < 1$ sec; AND STARTS TIMER T_3, $0 < T_3 < 5$ sec.
N
DOES THIRD CONTROL CIRCUIT C_3 DETECT TIME ELAPSED ON TIMER T_3>5 sec ?
NO
YES
L
DOES CONTROL MODULE C_3 RECEIVE CONTROL ACTIVATION SIGNAL A_3=1 WITHIN T_2 ?
NO
4
YES
M
DOES CONTROL MODULE C_3 RECEIVE CONTROL ACTIVATION SIGNAL A_2=1 ?
NO
3
YES
SET A_3=1 FLAG TO TRUE AND GENERATE ENABLE SIGNAL E_8 TO DRIVE BAR CODE READ STATE INDICATOR
O
IS ELAPSED TIME ON TIMER T_3 > 5.0 SECONDS ?
YES
P
NO
DOES CONTROL MODULE C_3 RECEIVE CONTROL ACTIVATION SIGNAL A_4=1 WITHIN 60ms?
Q
NO
R
SET DATA IN SYMBOL DECODED DATA BUFFER TO ZERO
YES
5

FIG. 48B

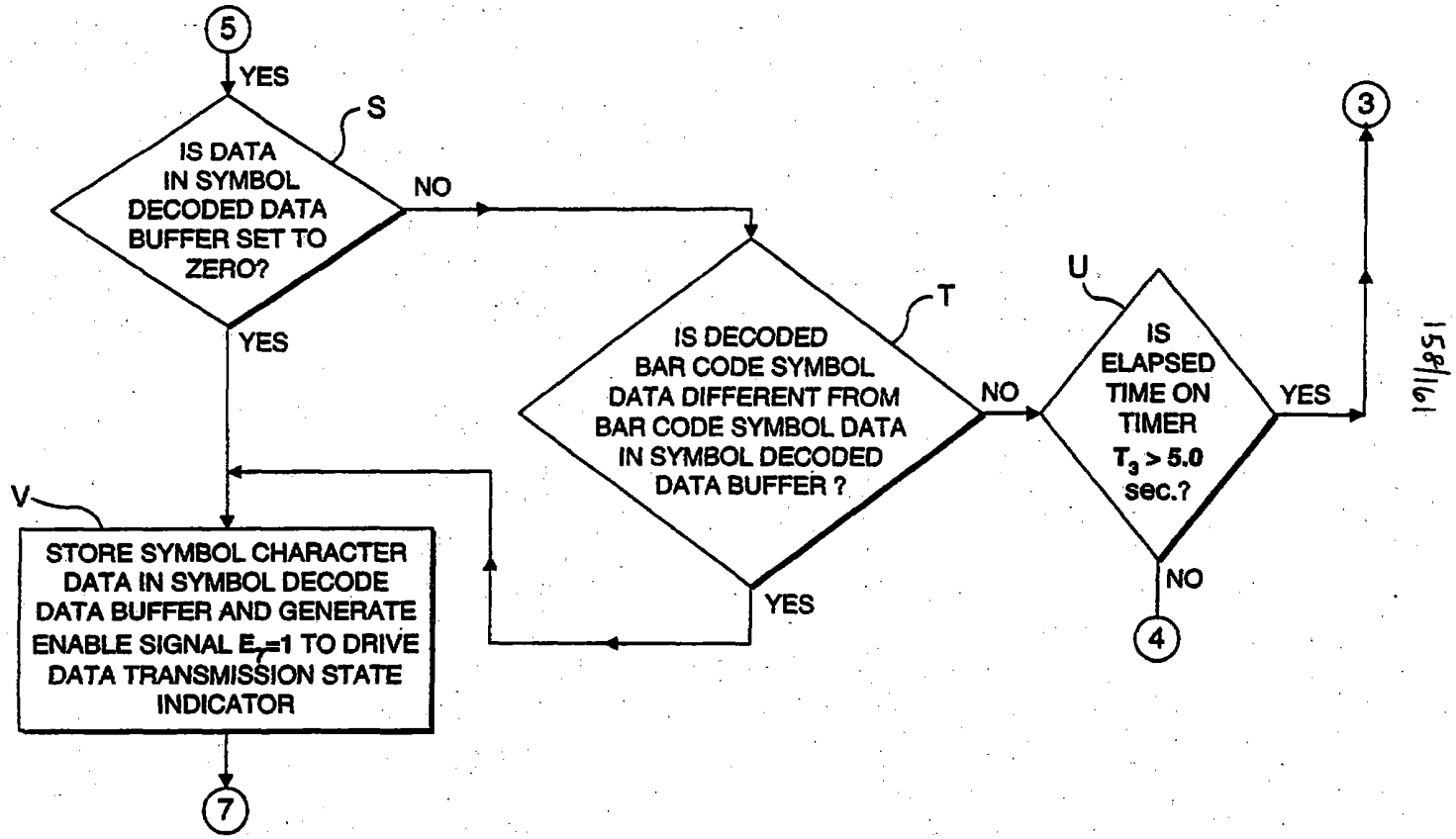

5
YES
S
IS DATA IN SYMBOL DECODED DATA BUFFER SET TO ZERO?
NO
YES
T
IS DECODED BAR CODE SYMBOL DATA DIFFERENT FROM BAR CODE SYMBOL DATA IN SYMBOL DECODED DATA BUFFER ?
NO
U
IS ELAPSED TIME ON TIMER $T_3 > 5.0$ sec.?
YES
3
NO
4
YES
V
STORE SYMBOL CHARACTER DATA IN SYMBOL DECODE DATA BUFFER AND GENERATE ENABLE SIGNAL E_7=1 TO DRIVE DATA TRANSMISSION STATE INDICATOR
7

FIG. 48C1

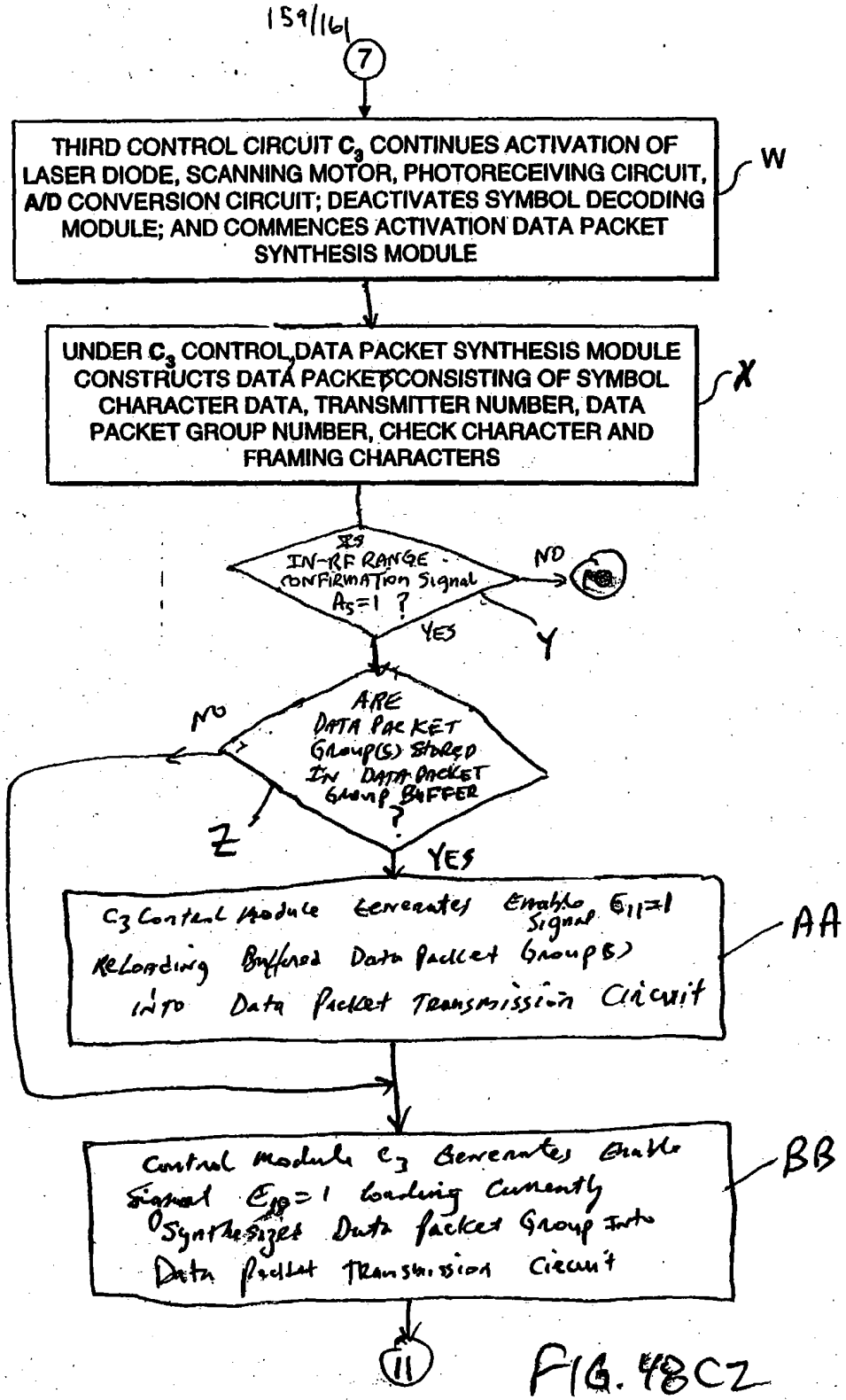

7
THIRD CONTROL CIRCUIT C_3 CONTINUES ACTIVATION OF LASER DIODE, SCANNING MOTOR, PHOTORECEIVING CIRCUIT, A/D CONVERSION CIRCUIT; DEACTIVATES SYMBOL DECODING MODULE; AND COMMENCES ACTIVATION DATA PACKET SYNTHESIS MODULE
W
UNDER C_3 CONTROL, DATA PACKET SYNTHESIS MODULE CONSTRUCTS DATA PACKET CONSISTING OF SYMBOL CHARACTER DATA, TRANSMITTER NUMBER, DATA PACKET GROUP NUMBER, CHECK CHARACTER AND FRAMING CHARACTERS
X
IS IN-RF RANGE CONFIRMATION Signal A_5=1 ?
NO
YES
Y
ARE DATA PACKET GROUP(S) STORED IN DATA PACKET GROUP BUFFER ?
NO
Z
YES
C_3 Control Module Generates Enable Signal E_{11}=1 ReLoading Buffered Data Packet Group(s) into Data Packet Transmission Circuit
AA
Control Module C_3 Generates Enable Signal E_{10}=1 loading Currently Synthesized Data Packet Group into Data Packet Transmission Circuit
BB
11

FIG. 48C2

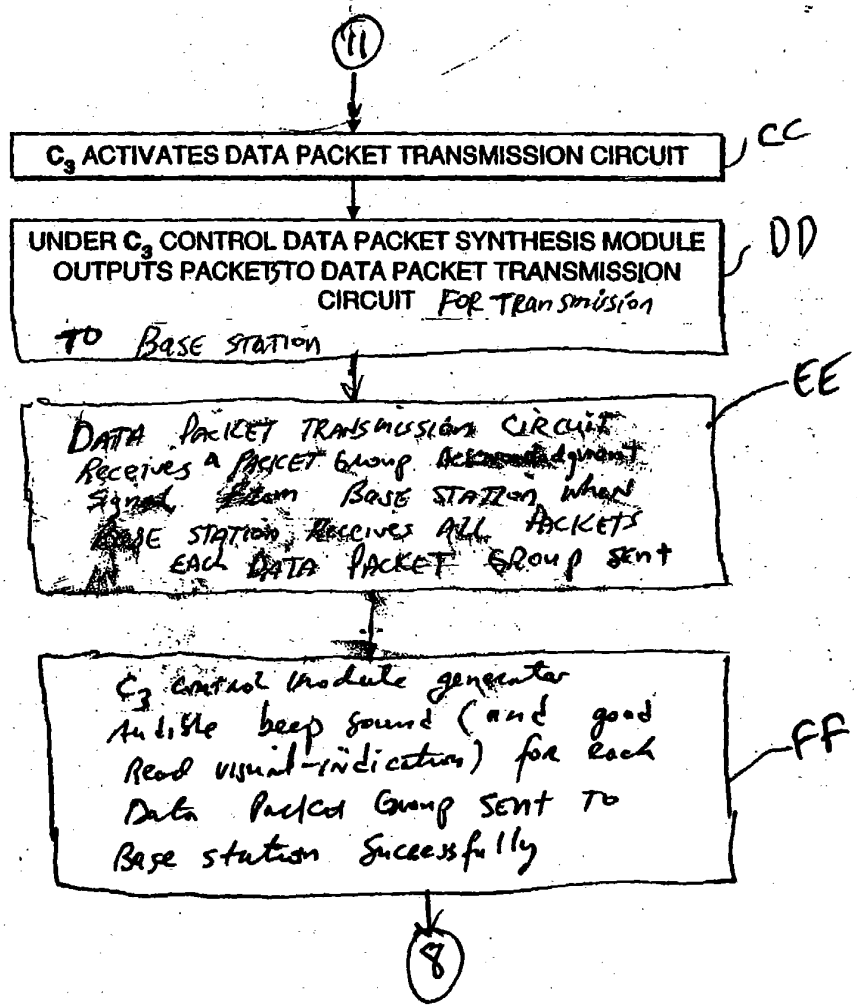

11
C_3 ACTIVATES DATA PACKET TRANSMISSION CIRCUIT
CC
UNDER C_3 CONTROL DATA PACKET SYNTHESIS MODULE OUTPUTS PACKETS TO DATA PACKET TRANSMISSION CIRCUIT FOR TRANSMISSION TO BASE STATION
DD
DATA PACKET TRANSMISSION CIRCUIT RECEIVES A PACKET GROUP ACKNOWLEDGMENT SIGNAL FROM BASE STATION WHEN BASE STATION RECEIVES ALL PACKETS EACH DATA PACKET GROUP SENT
EE
C_3 CONTROL MODULE GENERATES AUDIBLE BEEP SOUND (AND GOOD READ VISUAL-INDICATION) FOR EACH DATA PACKET GROUP SENT TO BASE STATION SUCCESSFULLY
FF
8

FIG. 48C3

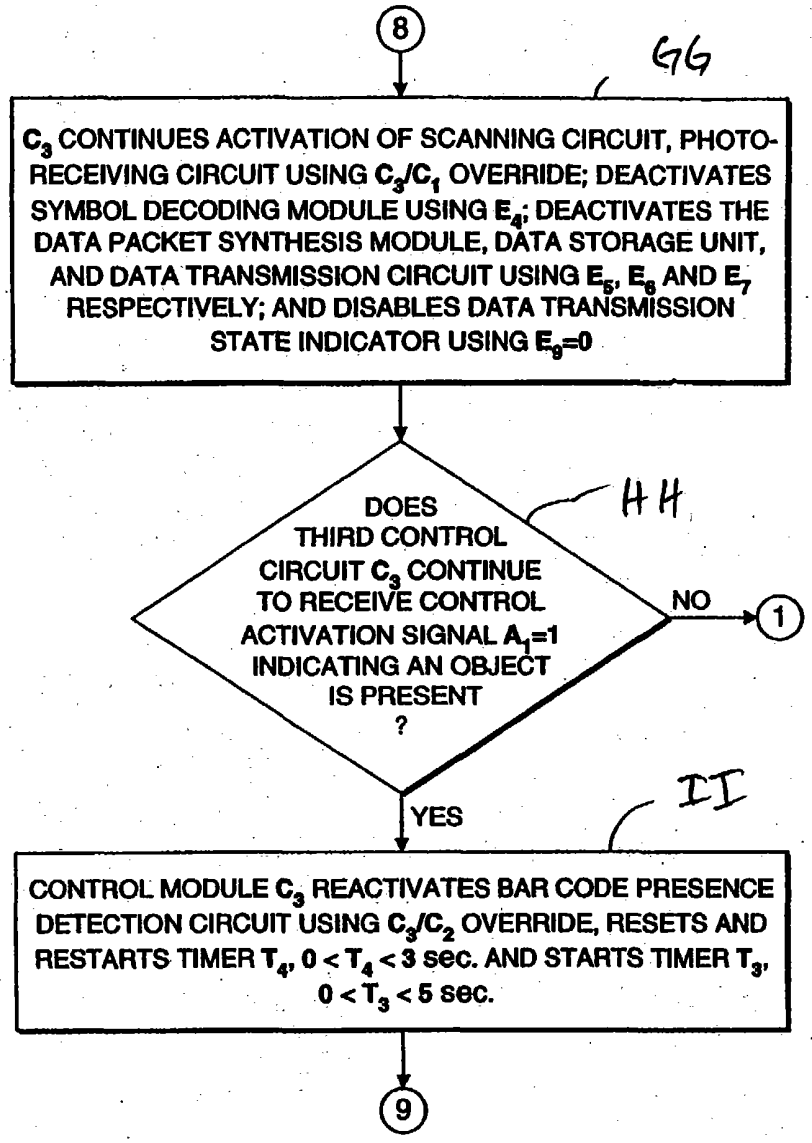

8
GG
C3 CONTINUES ACTIVATION OF SCANNING CIRCUIT, PHOTO-RECEIVING CIRCUIT USING C3/C1 OVERRIDE; DEACTIVATES SYMBOL DECODING MODULE USING E4; DEACTIVATES THE DATA PACKET SYNTHESIS MODULE, DATA STORAGE UNIT, AND DATA TRANSMISSION CIRCUIT USING E5, E6 AND E7 RESPECTIVELY; AND DISABLES DATA TRANSMISSION STATE INDICATOR USING E9=0
HH
DOES THIRD CONTROL CIRCUIT C3 CONTINUE TO RECEIVE CONTROL ACTIVATION SIGNAL A1=1 INDICATING AN OBJECT IS PRESENT ?
NO
1
YES
II
CONTROL MODULE C3 REACTIVATES BAR CODE PRESENCE DETECTION CIRCUIT USING C3/C2 OVERRIDE, RESETS AND RESTARTS TIMER T4, 0 < T4 < 3 sec. AND STARTS TIMER T3, 0 < T3 < 5 sec.
9

FIG. 48C4